Telephone Electronics Line

TELETRONICS COMPANY OF AMERICA

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.....new TSPS speeds operator assisted calls ---soon to go nationwide

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OL.1 NO.1 NOVEMBER 1974

TEL

PUBLISHED MONTHLY

To those of you who are now readers, let it be known that we welcome your correspondence! Truly newsworthy information about telephones and telephone companies across the nation is hard to come by. Therefore, any information that you, our reader, can supply will help to increase the scope of the Telephone Electronics Newsletter immensley. If you have seen any interesting newspaper or magazine articles concerning recent events in the telephone industry, please bring them to our attention. Even first hand discoveries or information you have come by through word of mouth may prove to be of value to other T. E. L. readers.

In addition to printing letters containing news sent in by readers, we will also answer questions written in by those interested in more information. We hope that two-way correspondence will be maintained with those interested in following the Telephone industry with us.

Please address all letters to:

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TSPS ... TRAFFIC SERVICE POSITION SYSTEMS

TSPS, short for Traffic Service Position System is one of the most recent innovations to be incurred on the telephone systems of many major cities. Much of the Los Angeles area has recently converted to TSPS, and the network of TSPS offices is rapidly expanding in all parts of the country.

Basically, TSPS provides for direct dialing of operator assisted calls by the subscriber. In other words, the subscriber dials the telphone number of the party to whom he wishes to place a collect or person-to-person call. The operator performs just those functions which only a human being can do, such as asking if a specific party will accept a toll charge, etc.

A typical call through the TSPS system would proceed as follows. Let us say a party in Los Angeles wishes to place a person-to-person or collect call to a number in New York. He then lifts the handset of his telephone, waits for dial tone, and dials "0" plus the ten digit number. The operator comes on the line to ask what type of call is being placed. If the calling party wishes a collect call, he replies, "collect from (calling parties name)". If the call is person-to-person, he replies, "person-to-person to (called parties name)". When the called party answers, the operator will ask if they accept the collect call, or whether they are the correct party in the case of a person-to-person call.

Whenever an operator is handling a call, the telephone number of the calling party is displayed on a nixie-tube readout. This is accomplished with ANI (Automatic Number Identification), a facility provided on TSPS trunking.

ong with the number to be called, the number the calling party is transmitted to the erator.

r billing purposes the operator requires an cy reference to the time, and a way of timing lls when it is necessary. Nixie readouts ovide the operator with the charge, minutes, te, and time of the call. These designations e not visible unless significant as much of e billing responsibilities previously belong- g to the operator are handled by automatic uipment making some information unnecessary.

the process of billing a person-to-person, llect, or station call the operator need never rite anything. Instead, the operator controls tomatic message accounting systems by the sh of a button. Only with credit card, third arty billing, and other special cases where nformation and numbers are given verbally, is t necessary for the operator to make a memo for illing purposes.

ost TSPS offices are controlled by an elec- ronic system similar to ESS. At the TSPS ffice the incoming information transmitted by he central office is stored in an electronic emory. Then the system looks for an unoccu- ied operator to handle the call. Once found, he call is connected to her switchboard, and he operator hears a short tone burst to indi- ate an incoming call. She then processes the all by acquiring all necessary information rom the calling and called parties and drops f the circuit, allowing the two parties to old a conversation. Meanwhile, the electronic ystem keeps an account of the call in order to roduce a billing record. When the parties ang up, the call disconnects automatically, a ity which previously had to be performed by the operator on cord type switchboards.

A diagram of the TSPS switchboard appears here to illustrate what the operator sees and does when processing calls. This switchboard is the Bell System's standard design and is used uniformly throughout all Bell System TSPS systems. Some private telephone companies have systems similar in operation to TSPS which are manufactured by such companies as International Telephone and Telegraph Inc., Stromberg-Carlson, Automatic Electric, and GTE Lenkurt. Though they differ physically from Bell System TSPS as in the design of their switchboard, the theory behind their operation is the same.

The physical operation of TSPS is an interesting process which involves some of the most advanced electronic systems and switching principles used in today's telecommunications field. Originally developed by the Bell System, TSPS can be adapted to serve all types of central office equipment. The most prevelant central office types are the step-by-step system, the crossbar 5 system, and ESS (electronic switching system).

When a person in a step-by-step system served by TSPS lifts his telephone handset and dials "0" plus a 7 or 10 digit number, the call is transferred to a register in the office. This register is associated with a TSPS trunk and is equipped with ANI (automatic number identification) which finds the calling parties number for billing purposes. Both the number to be called and the called number are pulsed to a nearby TSPS office through a TSPS trunk.

In a crossbar 5 system, when a party wishes to place a similar call and dials "0" followed by a telephone number, all digits are stored in a piece of equipment called an originating register. When it receives all of the digits the register transfers them to a piece of equipment called the completing marker. The completing marker employs ANI to locate the calling parties number, and connects a TSPS trunk to the calling parties line. The marker then connects a multi-frequency pulser to the TSPS

trunk and transmit th called and calling party numbers to th arby TSPS office.

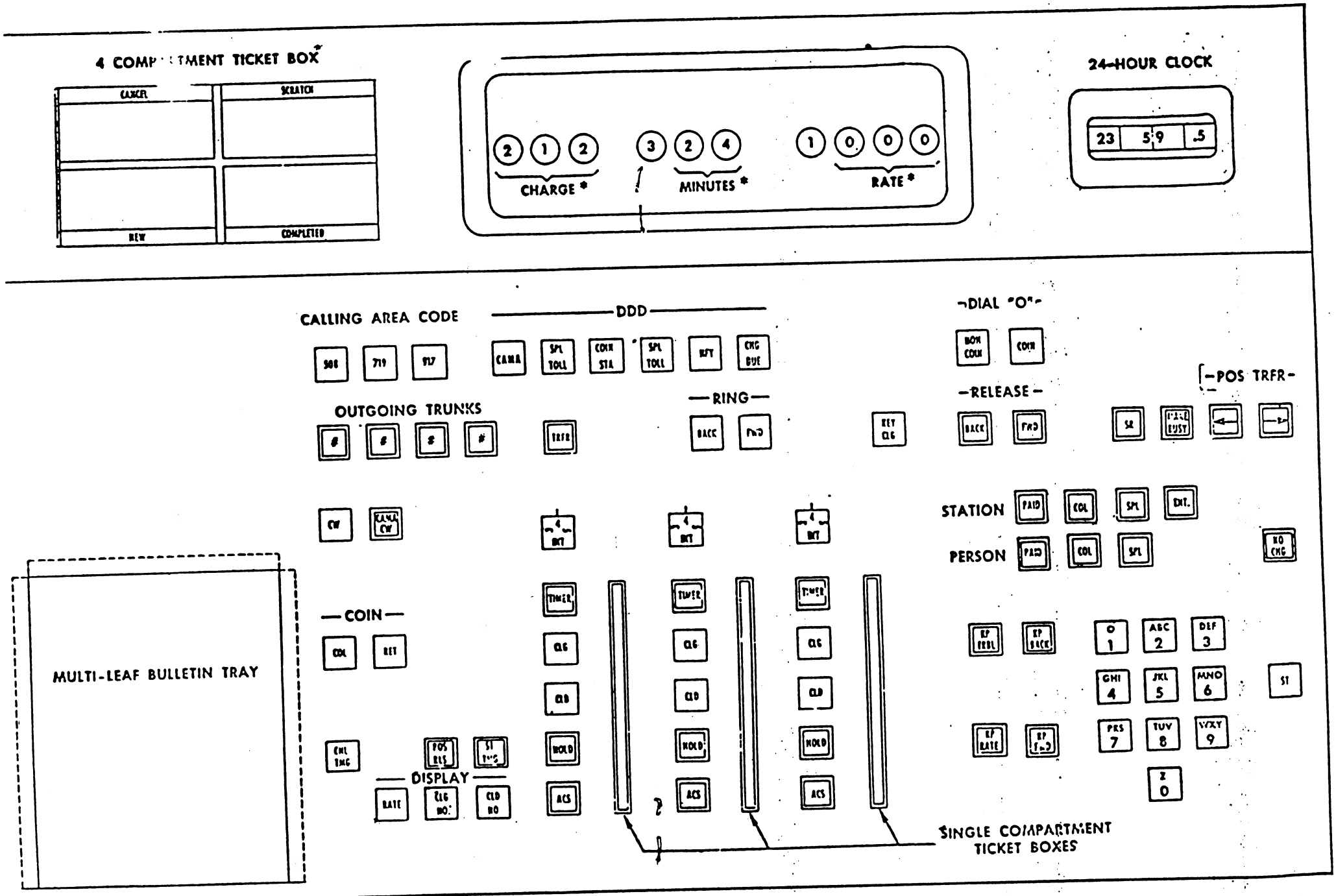
In an electronic swi ning system, the call is handled by a computer. When the calling party dials, the number is recorded and memorized in the computer memory. After dialing is complete the computer selects the appropriate TSPS trunk and transmits both called and calling party numbers. The process is governed by a computer program. Unlike the other central office systems which required hard wired changes in circuitry, ESS offices merely required a new computer program to be written to instruct the computer on TSPS operations.

THE OLD AND NEW — Cord board operators June Wilson (left) and Joyce Phillips recall their careers at Hollywood toll while operators Marianne Weichsel (foreground) and Betty Coggins typify the 115 operators who are handling the consoles in the new TSPS office.

NEW PRODUCTS

DIALER—This pushbutton device dials 7-digit numbers in less than a second. Its memory has a capacity of 16 telephone numbers of 15 digits each, 32 7-digit numbers or a combination of the two. To make a call, user moves a pointer to the name of the person to be called, lifts handset and presses the dial key. *Memtei Corp.*

ENCODING PAD—Model ME-47P Touch-Tone encoder is designed primarily for use with hand-held portable radios. With the encoder, user can place calls or access repeater stations from a hand-held radio. The standard LED equipped model provides a visual feedback of the tone transmission. Operating temperature range is from —20° C to +45° C. *Bramco Controls Division*



LEGEND

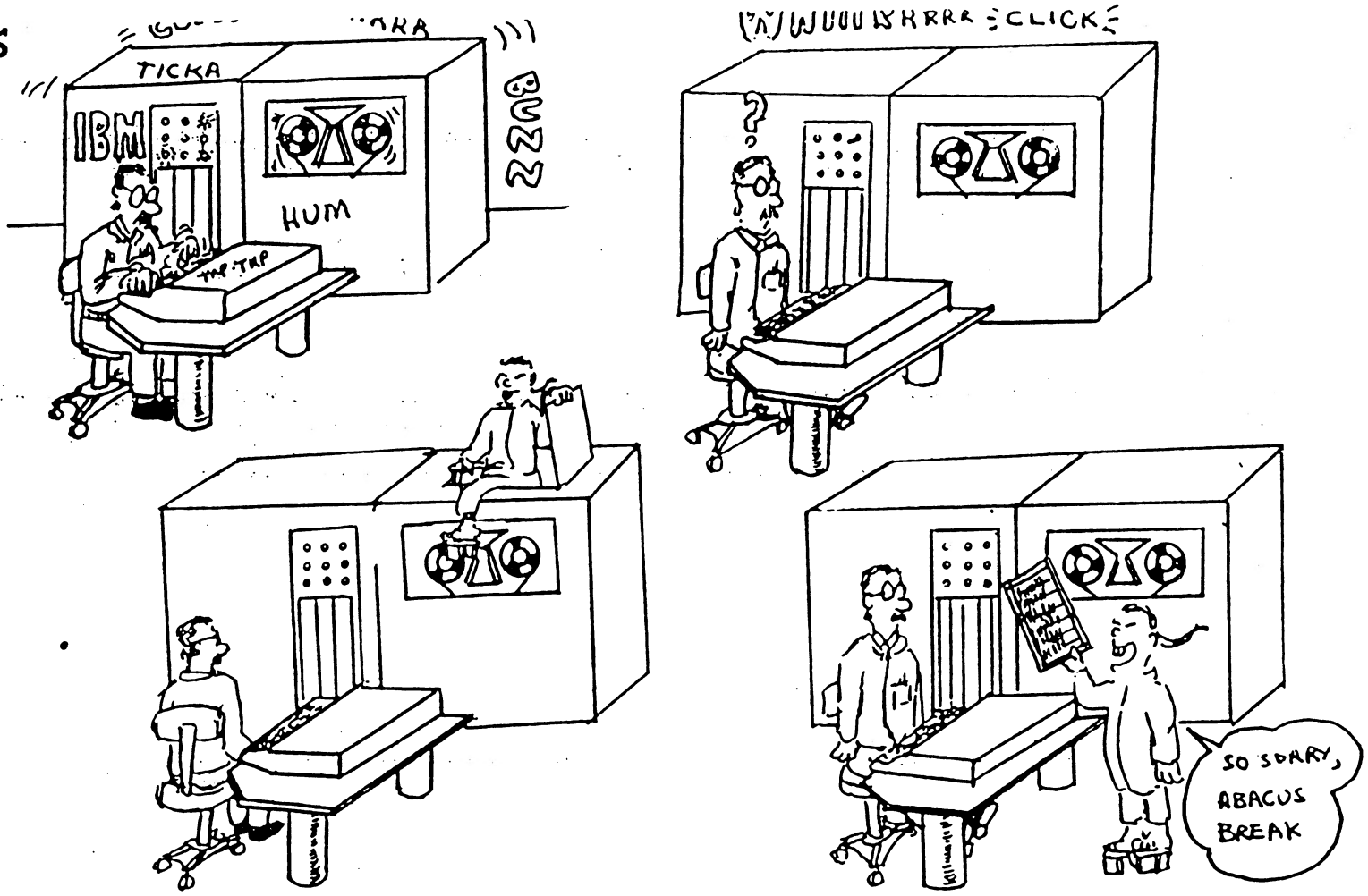
Non-Illuminated Key

Illuminated Key

Lamp

* These designations are not visible unless significant.

\# Trunks to rate and route, intercept, information, cord switchboard, etc, as required.



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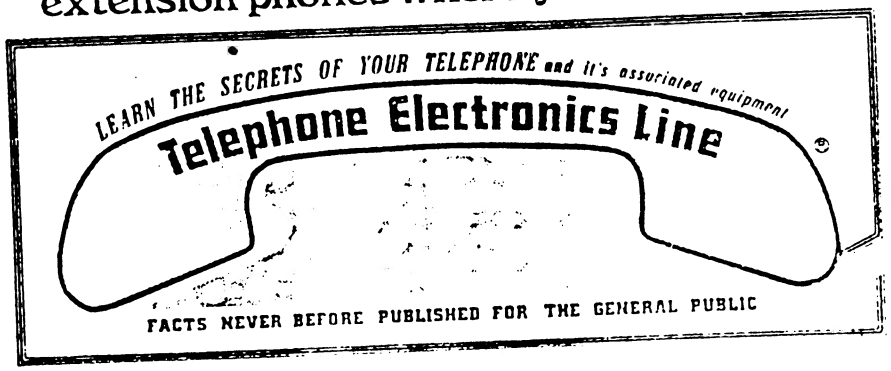
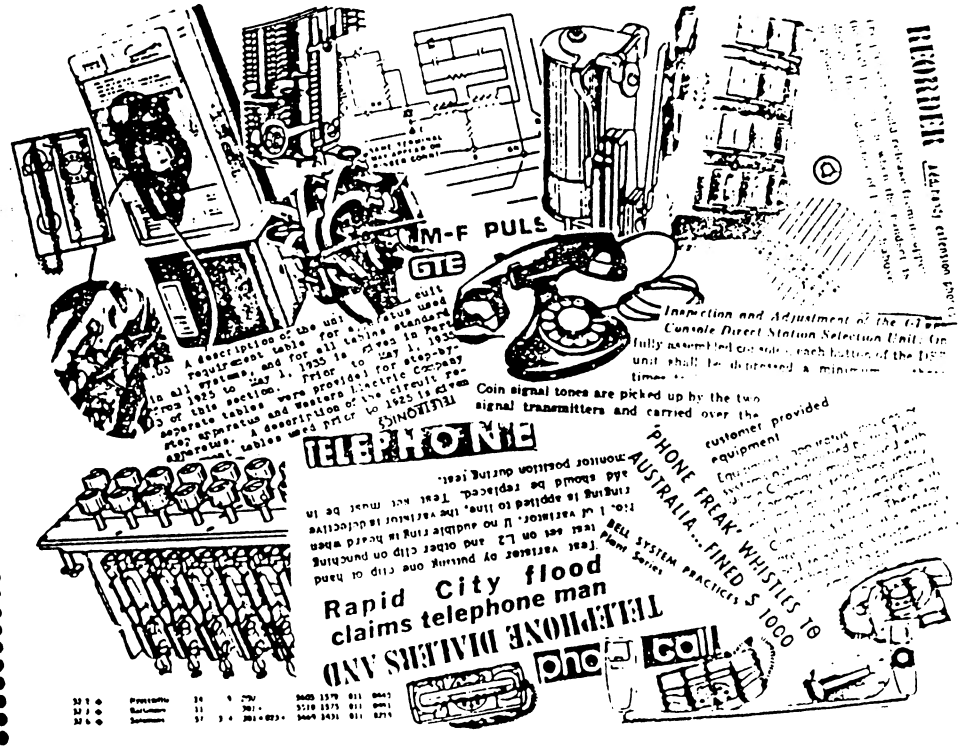
extension phones where you need them.





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- How to handle obscene telephone company employees
- How to get the best from your telephone
- *How many attachments can you wire to your telephone line?*
- What you can get for a dime (which is refundable)
- *how to call long distance toll-free*

dialing direct, area codes, long distance rates or something else about your telephone service?

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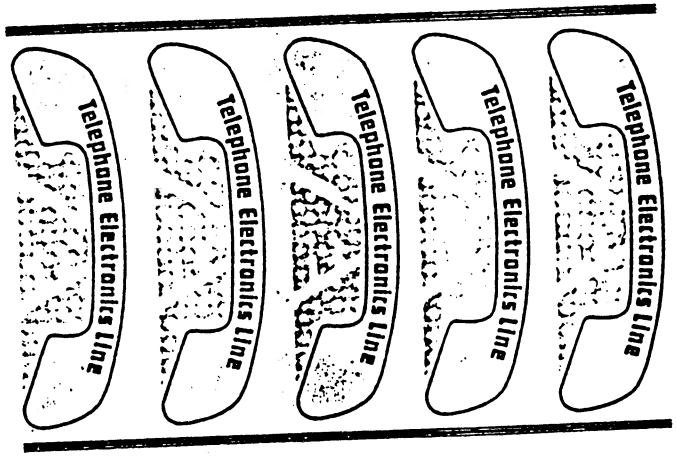

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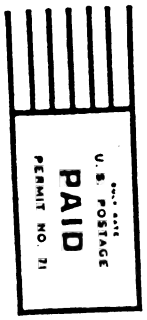

UST A NOTE....

ou apparently are interested in what TEL has to offer or ou wouldn't have responded to the advertisement that rought you what you are now reading. Starting in January— EL will include a complete telephone engineering course n monthly chapters beginning with the basics;TEL will an- wer readers questions and publish letters with greatest otency; TEL will compile an information exchange from eaders tips listing the phone company's test code numbers nd routing now in use; TEL, among many other feature rticles, will include in each issue Current News Items, 'lans, Illustrations, Stories, History, Comics, Games, 'rojects, and the secrets Ma Bell's toll not.

'elephone Electronics Line is the only publication of its ind, revealing the demanding secrets of the nationwide elephone monopoly. TEL is supported entirely by each and very one of its suscribers and therefore contains absolutely o advertisements. If the TEL staff were to convince you to ell just one subscription to a friend, a neighbor, a relative, our employer or employee, a teacher, or just about any- ne for that matter, you would be holding a booklet with twice s many pages and the knowledge of a dozen telephone com- any employees.

f you have not already signed up for a subscription or would ike to give a friend a New Years present, you still have ime to send in the form that appears on page 10 for the Jan- uary issue. It's not too late to receive all the 1975 issues of Telephone Electronics Line—delivered to your door each and every month of the year by an authorized agent of the U. S. Government.

MERRY CHRISTMAS

Hoping this issue reaches you in good spirits, the staff of Telephone Electronics Line wishes its readers the greatest of a New Year and a Merry Christmas.

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Published Monthly

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Editorial

By Jack Kranyak

Educator Mary Harris had her students harass homebodies on the telephone, as if Peter Piper picked a peck of peoples numbers and punished them with a poor time.

The academic object was to discover whether innocent victims answer hostility with hostility, according to Behavior Today magazine. University of New Mexico graduate students were instructed to make random wrong number phone calls, hassle answerers and then record results.

Pestered people lose patience, learned Ms. Harris, a finding any listed human being would have known without testing. Friend Burt Prelutsky admits as much in the same issue. Sometimes I think educaters taking surveys on hostility and aggression raise the ambient levels of hostility and aggression simply by adding to the natural static abroad in our land.

Other observations of the obvious from the Albuquerque experiment were that victims gave male callers more lip than female, turning surly sooner and cutting off the connection earlier. That's because males make more mischief on the telephone; who ever heard of an obscene caller with a soprano voice?

What the test didn't examine was the calling end of the interruptive wrong number. Why do people who make a mistake, even an honest mistake, want to punish the innocent person on the receiving end?

I've had an extraordinary experience along these telephone lines because I have one phone reserved for business calls. When that phone rings during non-business hours, I'm almost positive it's a wrong number call.

But to play it safe, I always play polite; I pick up the phone with a fairly friendly hello. "Morris?" a voice may say. "No," I'll answer, "no Morris here, you must have a wrong number.

Almost half the time the errant caller will then say, "Wh is this?" And I will then say, who are you? Only idiots tel imperfect strangers their names.

The person who dialed the wrong number invariably become angry when I refuse to identify myself. Maybe the caller i angry at himself or herself for having lost a last dime, per haps, or for have been handed a mistaken message. Bu the anger is turned outward, at me. As if I had no rights t privacy now that Morris the mystery isn't available.

The more polite Morris-seekers will ask, "What number this?" And I usually say, sorry, I'm unlisted, because if th caller is a crank I don't want him cranking right back.

If educator Harris were really doing original researc she'd have students trying to figure out why people who di wrong numbers take their frustrations out on wrong vic tims. Their behavior is the interesting, infantile response like the small child who blames a table for being there wh a baby stubs a toe on it.

People don't behave that poorly in face-to-face situation Someone who mistakenly slaps someone else on the bac apologizes profusely for imposing on the wrong party. Su a someone may be embarrised—and afraid of a punch on t nose.

The telephone is different; it prevents physical aggressi and permits anonymous aggression. The victim can't fi back, except verbally. So the first person to make a mista makes matters worse by adding insult to interruptive inju The telephone is a perfect disguise for breaking and enteri

Don't call me with your inquires, Ms. Harris, and I wo call you. Morris don't live here anymore and I resp poorly to academic provocation.

HOW TO CALL LONG DISTANCE TOLL-FREE

By David Rees

any of you have probably read various articles published well-known magazines which describe the activities of e notorious "Phone Phreaks". Three such articles which ight prove to be of interest are "Hello World-Tricks With Little Black Box" published in the April 21, 1973 issue of e Canadian magazine, The Province, "Regulating The hone Company In Your Own Home" published in the June 972 issue of Ramparts Magazine, and "Secrets Of The Lit- e Blue Box" published in the October 1971 issue of Esquire.

he Ramparts article was of a highly controversial nature ecause it published not only information about phone-phreak ctivities, but in addition, described how to build a "Black ox" or "Mute" as it is known. This easily constructed de- ice allows anyone to receive telephone calls free at no cost the caller. All newsstand copies of this issue were with- rawn at the request of the American Telephone and Tele- raph Company, and it has, as a result, developed into omething of a collector's item. The publication actually iolates section 502.7 of the California State Penal Code, he state in which the magazine publishers are located.

Completion of the free telephone calls is not reserved only or those with the technical knowledge and skill to construct "Blue Box" and use it properly, nor to those who build a 'Black Box", "Red Box", or any of the various electronic oll fraud impliments. There are a multitude of tricks and nethods which may be employed by any member of the gen- ral public despite his or her electronic knowledge. Most f these methods, though sometimes not as effective as a 'Blue Box" or similar contrivance, oftentime are more asily used and convenient at the spur of the moment.

Ever since its introduction, the credit card has developed he greatest notoriety as a means for committing toll fraud. The acquisition of someone's credit card number may mean plenty of free telephone calls at their expense. The codes follow a pattern which consists of the following elements: the 7-digit telephone number of the credit card holder + a letter code which consists of any letter of the alphabet selected on the basis of a specific key digit in the telephone number + a Revenue Accounting Office (RAO) code. Unfortunately, we do not have the 1975 credit card code, however, we hope to acquire it soon. This code allows the operator to check the validity of the credit card number in question, and those who know the code can make up credit card numbers which check out as valid by the operator.

Much of the toll fraud committed is accomplished through the use of telephone company established test circuits and test numbers. Phone Phreaks who make it a practice of being "parasitic" on these test circuits to accomplish free long distance telephone calls are called Number Phreaks. The average Number Phreak collects many numbers of call diverters, tie lines, and loop arounds.

The best known and the most effective of the above are the loop arounds. Loop arounds are test circuits which are accessed by two standard 7-digit telephone numbers. When each number is called by two parties respectively, they are connected together audibly and may speak through the loop around circuit. This is useful in evading message unit charges. Even though the two parties may be 3 or 4 message units apart, the loop around may be a number which is in the local calling area to both parties.

This use of the loop around test circuit barely approaches their full potential. Some loop arounds are set up in such a manner that calling either side(each of the two numbers for the loop around will be referred to as a "side" of the loop) does not charge the caller, even if he is calling long distance. Though these loops are not common in specific area codes, there are nearly 100 loops across the country that are non-supervising (do not charge callers). They are not well known, and dangerous to use. For those of you who can hear and recognize the supervisory signals which mean they are being billed for a call, there are no surprises. But some unfortunate souls have hit the ceiling when they discover that some sneaky switchman made the "non-supervising" loop around they were using supervising, thus billing them for hours of long distance calling. This is hard to explain to a cranky and sceptical business office person. In a future article dealing with long distance circuits, TEL will attempt to teach the method of detecting when billing occurs and how to hang up in time to avoid it.

Regular loop arounds, which are much more common, have their potentials. It is very handy to know plenty of loop numbers in your area and the areas you wish to call. Some methods for exploiting this resource are as follows:
Let us say, for instance, you are on vacation and wish to call a neighbor or friend. You place a person-to-person collect call from a pay telephone to his line to signal him that you wish to speak to him. He knows then to call a local loop around number because you have pre-arranged this with him. You then make a collect call to the other side of this same loop around. The operator who is placing your call will then be connected with your neighbor who is on the other side awaiting your call. He obviously accepts the collect call on behalf of the loop around and the bill is sent to the central office where the loop is located. They don't pay but are at a loss to find out who should!

Another method: Place a call from a location where there are two pay telephones. With one, dial one side of a loop. With the other, call the operator and place your call to the long distance number you desire. Bill the charges of this call to a third party—one side of the loop. When she calls to verify, you are connected through to her on the other pay phone and you accept of course. This is good to make calls only to companies or people who will not give you away.

Many of you probably know of these loop arounds. For those who don't, you must find them. The most effective way of doing this is by sequence dialing a set of numbers with characteristics similar to those of loops. Most loops end in suffixes which are truly telephone company type numbers. Tel. Co.'s favor suffixes with "1", "0", or "9" appearing recurrently. Here is a set of known loop suffixes for specific areas. It is by no means complete. We would therefore appreciate any contributions anyone might make with respect to improving and enlarging our list.

AREA CODE	STATE	LOOP ENDINGS
201	NJ	9929-9930
213	CA	1118-1119
215	PA	0094-0095
303	CO	0009-0068
312	IL	9930-9931
313	MI	9996-9997
412	PA	0092-0093

continued on page 7,col.1.

by John Reynolds

How many attachments can you wire to your telephone line?

I was once asked jokingly by a Telephone Enthusiast, "If I can plug anything I want into my power line, why can't I plug anything I want into my phone line?" Truly, the phone company in most cases frowns upon the practice of hooking up one's own telephones, answering devices, and assorted other telephone accessories directly to the telephone lines.

Telephone companies are usually regulated by a commission located in their state which is established to limit public utilities with respect to their prices and practices. This is done because all utilities constitute geographical monopolies. These commissions establish rules called tariffs, which serve as guidelines for fixing rates and services. All equipment rented by telephone companies such as answering machines, business key systems, etc., have a tariff associated with them.

In most cases, the connection of customer-owned equipment directly to Tel. Co.'s lines are prohibited. Penalty for such an action is the removal and denial of telephone service. For the purpose of associating customer-owned equipment with the telephone network, tariffs usually provide for "connecting arrangements" or "couplers". These devices are designed to protect Tel. Co. lines from blunders on the part of the customer's equipment which may cause protector blowouts, central office shock hazards, or similar problems.

Some companies would have you believe that you can buy or construct your own "legal connector". This is true in part. The fact is, you can make your own duplicates of the Tel. Co. connecting arrangements, however, these are designated as "customer-owned equipment" by tariffs and cannot be hard-wired to the telephone network. Your home-made connecting arrangement will require a tariffed Tel. Co.-owned connecting arrangement in order to be hooked up to the telephone network. Ridiculous? Yes, but true!

It is unfortunate that Tel. Co. charges so much for these devices while their function is so limited. In order to hook up one's own answering machine, it often costs more to rent a coupler for it than to rent a Tel. Co. answering device. In this way, Bell and other Tel. Co.'s manage to monopolize on equipment. For this reason, you may decide that it is better to hook up foreign equipment yourself and take your chances, than to rent a complicated and often annoying coupling arrangement. In order to do this safely you must follow some important guidelines.

AVOIDING DETECTION

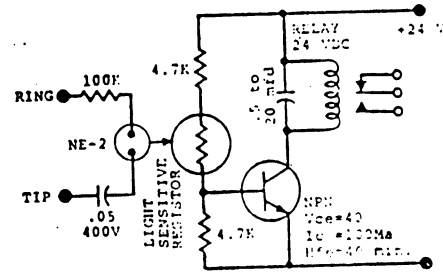
Your most important concern when violating tariffs is to avoid detection by Tel. Co. authorities. In most cases, the phone company will not discover your attachments whether you make it difficult for them or not. The fact that so many unauthorized extention telephones are hooked up across the country would seem to point to this assertion. One of the most common practices used in making extention telephones undetectable is to disconnect the bell. Thus, no extra bell impedance is present on the line due to the extention. You may disconnect the ringer (bell) in your telephone by removing the wire or wires from the bell that connect to the network (the connecting block with many screw terminals on it). This will effectively stop the ringing (and possibly) the detection of the telephone when in the "on-hook" condition.

In the Bay Area (415 NPA) a recent effort has been made by Bell System authorities to counteract the extreme number of illegitimate extention telephones hooked up by customers. Most of these customers have avoided detection by disconnecting the ringers in these extentions. A new process developed by Bell involves the measurement and recording of the impedance of everyones telephone line. This information is logged down. Then, a year later, the same measurements are made and recorded. The measuring devices used are extremely accurate and can discern the difference in impedance caused by even extra lengths of wire. Thus, if some customer hooks up an extention phone, even with the bell disconnected, the phone company will detect the difference and send a note warning the customer to cease and desist. Such campaigns may be initiated in other areas without your knowledge, however, the chances against it are large due to the high cost of such a project.

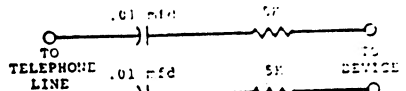
In the case of attachments such as automatic answering devices or call forwarding units, your best bet is not to give Tel. Co. any reason to check your line. In many Bell System offices, automatic trouble recording equipment monitors the status of much of the central office. If your particular device causes problems, this equipment will point it out to the switchman who may then notify your business office administration. If your telephone office is old, the trouble detection equipment is most likely to be poor or non-existant, and you needn't be so careful.

HANDY ACCESSORIES

The following circuit is a ring detector which can be used to wire additional extentions which ring. It is undetectable by the local switchman, due to its extremely high impedance. The parts are easily acquirable at any electronics supply store. In order to make extentions ring, simply wire the relay contacts to control the supply of a 20 cycle AC source of 115 volts to the bell in these extentions. In addition, it can be wired to control a gong, a chime, a buzzer, or such



If all you need is an audio connection with the telephone line use the second circuit indicated here. It is simply a very high impedance input/output network for associating amplifiers or recording equipment with the line.



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How to handle obscene telephone company employees

By Donald Simmons

Have often found business office representatives are less han helpful in executing their duties. For instance, it was complete chore to have different types of connecting ar- angements such as a QKT Audio Coupler ordered for my elephone line. Some representatives didn't seem to know hat I was talking about (lack of education in their field) hile others seemed deliberatly bent on causing problems or me. Once, I was told by a service representative that I ould not have a single plug-and-jack arrangement. When I emanded to know the section, number, and page of the tar- ff which states this, he told me to hold on, appearing 15 inutes later to tell me that I could have the arrangement fter all. Remember, if a telephone company representative ells you that you cannot do something, demand to know what ariff section stipulates it. Thus, you can verify it yourself y looking it up in the tariffs which must be made available or public inspection by your telephone company.

Many people express the fear that the telephone company "taps" or monitors their telephone conversations. For the most part, these fears are groundless, based mostly on plenty of telephone line static and an overactive imagination. If you really believe that you may be monitered, stop and ask yourself "What reason would the Tel. Co. have to mon- itor me which would be worth their time and trouble?" In most cases, no good reasons exist. It is true, however, that such illegal taps do occur and to a limited extent. I know of a number of cases of monitering by Tel. Co. employees that were authorized niether by the courts nor by Tel. Co., one of which I was directly involved in.

In my case, I was speaking with a friend on a MMU call, when the line suddenly became disrupted. My side-tone bal- ance was distorted and line loss increased considerably. Suddenly, I heard dial tone on the line, yet I was still con- nected with my party. Without hanging up the phone, I used my other line to dial a test number I knew to be associated with the test board in my central office to check if my sw- itchman was causing the trouble deliberately. My suspicions were confirmed when I was abruptly connected to my other line and could hear my friend speaking through test board.

When I called the switchman by dialing the switchroom num- ber, the switchman admitted to monitering my line, saying he had a court order (this was not so) and accused me of being a phone phreak. He called me a few choice things which I shall not write here and threatened to come to my house and "do something about it personally".

I filed a formal complaint with the California State Public Utilities Commission which investigated the matter thor- oughly. When they pressed for answers, the Pacific Tele- ephone Company admitted that my line had been illegally monitered, but said that it was done by a switchman without their knowledge. Little more was done after this, however, had I wished to press charges, the Tel. Co.'s admission of the crime would have been as good as gold in gaining a con- viction.

Another case involved a friend who works for Pacific Tele- phone. He said that the technicians in his office often ran connections from peoples lines to a loudspeaker and listened in for entertainment. Though monitering lines for repair purposes is legal, this practice hardly strikes me as a part of maintainance.

If you have any legitimate grievances with the phone com- pany, your best bet is the Public Utilities Commission in your state. Really, they're there to protect your interests and can (at times) be very hard on the telephone company on behalf of telephone subscribers. *

What you can get for the price of a dime (which is refundable)

By David Rees

Due to the recent increase in pay phone vandalism, both Bell System and independent telephone companies have been attempting to build a better pay telephone, one which refuses to be broken into or ripped off. Some of the newer pay tel- ephones are truly marvles of armor-plated engineering with little opportunity to acquire the coinage held within its strong box.

Even with all those anti-vandalism features pay telephones are still vulnerable to attack. There are a larger multitude of tricks which may be employed to acquire the pay tele- phone's service without depositing any money. For the most part, these methods require no external devices of your own, but merely the use of your hands and mouth (and sneaky brain).

Perhaps the simplest ploy conceived for a free local call from a pay phone is to simply call the operator and inform her that you lost your dime. When she asked how it happened say you dialed and heard a fast busy signal or some such noise. She will place your call again for you without charg- ing a dime, despite the fact that you may not have placed the call originally.

Another simple but not always effective method involves not saying anything to the operator. When placing a message unit call on a telephone system which allows direct pay- ing when a coin collect operator comes on the line. Some- times she will unwittingly allow the call to go through by overlooking a special dumping key, however, your success

continued on page 8, col. 1.

Letters from the reader

Gentlemen;

I just received my first issue of TEL (Nov.) and it is with regret that I express great disappoint- ment with the utility of its contents. The main article, concerning TSPS systems, is a reasonable explanation of the system logic involved in TSPS but I ask you, WHERE IS THE ELECTRONICS?

Frankly I resent paying for "SECRETS OF YOUR TELEPHONE" and "FACTS NEVER BEFORE PUBLISH- ED FOR THE PUBLIC" when I am getting little more then PR handouts and frankly unimaginative car- toons. As you folks are also merchandising num- erous devices designed to be interconnected with telephone lines, how about information on how Ma Bell detects foreign devices on her lines? South- western Bell in Tulsa is rapidly going ESS, and also has one of the most tamper-proof systems ex- tant for detection of the state of the customers telephone. While many east coast Bell systems use a simple DC current flow sensing system to detect an answered phone or lifted handset, the Tulsa system utilises both AC and DC sensing, with low leval AC detection signals covering the frequency range needed for speech. Or at least so it ap- pears. This is an extremly sophisticated system, and indicates the extent that Bell will go to to- ward the simple-minded "Black Box" devices which many people use to try to avoid LD billing. These devices simply do not work in Tulsa. There is no system which cannot be gotten around, however, and Bell has just made the getting around a bit more complex.

A suggestion: How about an issue devoted to the operation of the equipment that a customer generally has access to; IE the standard telephone, how it works (DETAILS PLEASE) and how it interrel- ates with the Company's other electronics. One should cover both the standard dial and "Touchtone" phones, preferably giving actual parts values (IE coil impedances, cap values, ect) and what rela- tionships these values have to the function of the system. Improvements to the home phone should be described, such as the circuit included for adapt- ing a standard telephone handset to use a dynamic microphone for improved clarity and dynamic range.

K. K. , Tulsa, OK

Dear K.K.,
Sounds like a good idea. TEL will be pub- lishing more circuits and methods which allow the telephone customer to "do" rather than "observe". We appreciate your interests and suggestions. In the next issue, there will be a large reader response column which will include the many ideas that you will be most definately interested in.

THE AUTOMATIC WIRETAP are your telephone conversations really private?

By David Autovon

Most of us have at one time or another become impatient with a constant busy signal and made an "emergency call" to the party we desire to reach. This type of call is made through the operator only. The operator interrupts the con- versation by connecting to the telephone line desired and requesting they release the line. Simple as it sounds, this action requires the operation of an entire switching system, and trunking and operator network designed specifically for emergency calls. It is called the verification system.

On most standard operator cord switchboards, a set of jacks is set aside for emergency calls. These jacks represent the terminations of "no-test" or "verification" trunks. Each operator may use these trunks for emergency calls within her office or exchange. To interrupt a given call, the oper- ator must plug into the appropriate no-test trunk and key the telephone number of the desired party on her multifrequency keyset, preceded by KP (key pulse) and followed by ST (start). She is then connected into the conversation by central office equipment, after which she may inform the party of the emergency call.

If you are placing an emergency call to a party in another office or exchange outside the area handled by your operator, she must contact another operator to place the emergency call. The operators whose specific job it is to place emer- gency calls are called verification operators. They are usually reached by dialing a standard 7-digit telephone num- ber which is known only to operators and other authorized personel.,

Each "0" operator is supplied with the telephone numbers of the verification offices she may have to place calls to. In Los Angeles, some examples of verification office numbers are 870-1111 for Culver City and 629-1111 for East Los Angeles. Note that the suffix "1111" is used for each num- ber. This is the case for all 213 area code verification offices. The purpose of this is obvious. "1111" is much more rapidly pulsed by automatic equipment than any other digit combinations. Should you wish to experiment to deter- mine the verification number suffix for your area, try start- ing with "1111". When the verification operator answers

continued on page 8, col. 2.

Debugging The Buggers

By Robert Klien

In a recent article, Telephone - Electronics - Line made a noble attempt to explain the basics of TSPS (Traffic Service Position System). Now, we will explore some of the lessor known phenomenon of TSPS. Specifically, we will deal with the use of verification trunking as related to TSPS.

Did you ever consider how verification is handled for in- office TSPS lines? Since there are no verification trunks that are associated or terminated directly on a TSPS type console, the TSPS operator must depend on special routing codes to perform a verification check for an "OD Condition", Out-Of-Order Condition resulting from an ROH (Receiver Left Off Hook), a CPH (Called Party Hold), or simple emergency announcement on a line in use.

THE SCRAMBLER

This special circuit, dubbed "The Garbler" or "Garb" by Pacific Telephone people, has many options and special features. As a working example, we refer to the 415 NPA (Number Plan Area), where "Garb" is now in use. When the customer requests an OD check, the TSPS operator accesses a free loop (by depressing the "ACS" key on her console) and keys "027+7D" - 7D being the 7-digit number to be tested. When the ST key is pressed, the Garb unit is activated, causing a special trunk to be opened to the cen- tral office in which the requested phone number is located. After the 7-digit number is keyed, the special scrambler equipment selects the line called for through a no-test cir- cuit and connects. If the line is not in use, a reorder (120 ips) busy signal is received to indicate this condition. If the line is in use (as a result of an OD condition, conver- sation, etc.), the operator will hear a steady tone (dial tone, silence, or garbled voice-range frequencies to indicate a conversation in progress. Depending on the result of the OD test, the customer will be informed either that the line re- quested is OD or in use.

ACTUAL VOICE VERIFICATION

If, when informed that the line is in use, the customer desires an urgent or emergency line verification, the oper- ator follows this procedure: She re-dials through the Garb circuit, and when voice--type frequencies are received depresses her foreward-ring key. This causes the Garb equipment to drop the voice-scrambler circuit (provided of a one-way talk arrangement) and connect directly through the no-test trunk to the requested line, causing a two-way link between the requested phone line and the operator. As a security precaution, a click is produced on the line in question when it is being tested for OD, and a louder click accompanied with a marked decrease in trunk transmission qualities is produced when it is actually verified. The TSPS operator now announces the verification, and normal ver- ification procedures are followed. When the operator re- leases the Garb trunk, the verified line is restored to nor- mal operating condition, and the trunk is accordingly re- leased from the TSPS board.

As a note on toll; when this type of verification is used, the toll operator follows the same procedure except:

A - The 3-digit access code may be different
B - The yellow ring key may be depressed for a two-way verification circuit.

Already, this system, which is called the Garb system, is now in widespread use in places such as 914, 415, and 2[illegible] Perhaps one of the main reasons for establishing this sys- tem was to tighten security of telephone lines. 7-digit cus- tomer dialable verification numbers that ring into verificati[illegible] operators are simple to use for illegal purposes, where you must have specialized equipment, a particular group trunks or tandem circuits, and a specific knowledge of t[illegible] access codes and special requirements of the system [illegible] are accessing to effectively use the Garb system. If [illegible] know of such information, and can add to it, then plea[illegible] drop us a line. Any suggestions and/or corrections wo[illegible] be greatly appreciated. When writing, please refer to t[illegible] name of the article which you are questioning or commen- ting on, the Volume and Issue No. or date of publication.

lime continued from page 7

based on her experience and familiarity with the equipent and how busy or distracted she is at the time of your all.

any telephone companies have had trouble with subscribers ho place collect calls to pay telephones. This method of voiding charges works only if the operator is under the upression that the pay-phone number she is calling is a ubscriber type telephone. An example of such a scheme night proceed as follows. An individual on vacation in Oreon wishes to speak to a friend in Los Angeles without pay-ng the toll charge. By placing his call person-to-person ollect to his own name when calling the L. A. number, he an signal the party there that he wishes to receive a call-ack. The called party, by stating that the desired party is ot at home and that he will return the call when he gets ack, he can usually acquire the pay-phone number from he operator. The L. A. party may then make a collect call ack to the pay-phone, and the Oregon vacationer will accept harges without having to insert money into the coin slot. This works most dependably when the fourt digit of the pay-hone is not a "9" (in some areas). The operator is reassured if you answer with a business name such as "Smith Plumming Supplies" or "Western Air Lines, Information Desk". Any phrase such as these will do, however, be certain that it does not imply a pay telephone in any way. Due to a recent increase in the number of collect calls to pay-phones, many telephone companies have initiated campaigns to remove the bells from their pay telephones.

Another method takes advantage of a lack of communication between the operators. It is used only for the completion of free overseas calls, and its workability is not common to all telephone systems. The procedure is as follows: Go to a pay telephone and dial the operator. When she answers, tell her you wish to place a call to information in Britain. She will then key the number of the overseas operator located in the United States whose job is to handle all overseas calls. Your operator will then tell the overseas operator that you are calling from a pay telephone and leave the line. You tell the overseas operator that you wish to speak with information in London. She will dial the number and leave the line. When she leaves the line, flash the hookswitch (hang up for about a second). You should then be re-ringing into the overseas operator. When she again answers (it will usually be a different operator), she will not know that you are calling from a pay-phone or what the number is. Tell her the overseas number you wish to speak with, and a ficticious number from which you are supposedly speaking. She will then complete the call, billing it to the number you gave her. Make sure the person or business you are calling has no record of you or your call.

Next month:

Current News Items — Construction Plans
Illustrations — Code Numbers
Projects — History — Stories
Games — Comics — Facts

Phone booth special

You can try it too!

Try calling a long-distance number (such as directory assistance in another city) and whistling off, clearing the trunk. At precisely midnight (when everyone is calling everyone else) on New Year's Eve, someone's bound to jam into the trunk you're on. This will happen when you maintain a constant 2600 Hz on the trunk. When another person's trunk siezes yours, he will be charged for the call when you release the 2600 Hz.

On many pay-phones you will find a notice on the emergency information card indicating that it is illegal to bill calls to numbers you are not authorized to use. It is possible to pre-arrange with the long distance party you wish to call, to call them at a specific pay telephone at a specific time. You then call that pay-phone from a pay-phone and bill it to a third party number. The operator will attempt to verify the third parties acceptance of the call by calling the number to ask the party. Make sure the number you give her is a test number which either rings indefinately or is constantly busy. In the 213 area code numbers with the suffix (last 4 digits) "0699" are usually busy, while numbers with the suffix "0299" ring indefinately without an answer. In other areas the numbers are probably different. If you know of or discover any numbers as such, please send them to Telephone Electronics Line. When we have a list of these numbers across the country, we will publish them in TEL. *

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she will say "verify". A good strategy for finding these numbers is to listen carefully when the operator places a call to one. In most cases the automatic equipment repulses the number, producing distinct clicks for each digit. By counting these clicks, the number can be determined and then tested by dialing. Those of you who find these numbers or have any information concerning their operation in your area please send them to Telephone-Electronics-Line. Eventually, we hope to publish a fairly complete list of verification numbers all across the country.

The verification network is by no means secure or tamper-proof. The fact is that just about anyone with the right numbers to call and the correct things to say could tap into anyone's telephone line using telephone company circuits. It has happend many times, and is usually practiced by the notorious "Phone Phreaks". The process they employ is described in the following.

Let us say that Joe Phone wishes to listen in on the conversation of John Smith at 555-2368. Joe dials the 7-digit number for verification in that office. The verification operator answers "verify". Joe replies, "This is Phil Donehue on the 4-A 17-C test board. We have some trunk testing to perform and require a no-test trunk for the 555 office". Depending on the air of authenticity of the caller and the gullibility of the verification operator, she may extend the cord to the trunk requested or question further. If Joe's telephone knowledge is up to par, Joe may be able to satisfy an operator at this stage, however, the smart Phone Phreak will give some excuse to hang up and try later. Once Joe has been plugged into the no-test trunk he whips out his trusty "Blue Box" and dials "KP 5-2368 ST" and is abruptly connected to Joe Smith's line.

Some Phone Phreaks whose capacity to sound authentic is above average but do not have a Blue Box to perform the necessary key pulsing manage to have the verification operator connect them to the line they wish to tap by performing the key pulsing for the would-be switchman. This is definately not easy as the operators are necessarily careful and reluctant to act in such an unfamiliar situation. In addition, the operator must be off the line when the connection is completed, otherwise she may hear some of the conversation to be tapped and suspect foul play.

If you wish to tap lines yourself, you should know something beforehand. It is a Federal crime carrying very stiff penalties for anyone to interfere or moniter communications unless authorized to do so by the court. In some areas it holds additional penalties due to state laws forbidding it.

It is not illegal, however, to dial verification yourself in order to place your own emergency calls. This can prove to be much faster than using the operator. Simply mimic the words of the operator when you hear her placing an emergency call. One might call it "Direct Dialed Emergency Calls". *

By Jack Kranyak

Call Santa this year and wish him the best!

Yes, it's that time of year again when wee little ones and grown-ups alike prepare their Christmas gift-lists for St. Nicholas. Every December millions of people across the globe compose elaborate lists of toys, bicycles, games, all kinds of presents and everything else imaginable for friends and relatives.

Unfortunately however, most of these goodies will never be delivered (let alone reach Mr. Nicholas) due to the heavy holiday mail. During the last week of November and all through December the postal kings urge mail order houses and large companies to hold back on their mailings. Meanwhile, everyone else is mailing thousands of Christmas cards to everyone they can think of reminding them to have a Merry Christmas. And yet, have you ever thought of giving Santa a call on the telephone! Sound absurd? Try it....

A few weeks ago, someone suggested to phone Santa Claus as a joke. I bet the operator thought it was some joke when she held my line after trying to get her to place a call to the North Pole. After convincing her supervisor that I was for real, and indeed wanted to speak with Santa Claus, she transferred the call to her manager. Quickly, the manager and I became friends when she learned all I was trying to do was to get my Christmas orders in early for the tots. She apologized for her operators conduct at my attempt to get an area code to place the call originally, but was unable to find one herself.

Could it be that the Bell System, with all those elaborate libraries of cross-references did not have a listing for an area code for the North Pole? In vain, I wished this lovely lady a Merry Christmas and hung up.

I was still determined to speak with that fat jolly guy up there. So I whistled up directory assistance in Fairbanks thinking if I were to ask anybody, it may as well be an Eskimo. The operator repeated, "Directory assistance for what city?" I responded, "North Pole, please." Already I had the chills. She connected me to another operator and I told this new one that I wanted the number of a Mr. Santa Claus.....

Well, it turns out that I never did get to speak with Santa, but I did have a chance to speak with his servant. I was told that Santa could be reached in the second week of December and between seven and nine o'clock would be the best time to call. I presume that would be 7 & 9 their time and in the evening accordingly.

Feeling that I had at least accomplished something (whether only to speak with his servant), I called the supervising manager back and had no trouble reminding her whom I was. I told her to write in her book "907" (the area code for the North Pole) should there be any future requests to speak with St. Nicholas. Wishing each other a Merry Christmas, I hung up and finished my Thanksgiving dinner. So much for calling Santa right now. *

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AREA CODE	STATE	LOOP ENDINGS
415	CA	0044-0045
416	ONTARIO	1186-1187
503	OR	1000-1001
514	QUEBEC	1194-1195
515	IA	0005-0006
609	NJ	9929-9930
617	MA	9907-9908
		9933-9934
702	NV	0044-0045
714	CA	1118-1119
716	NY	9911-9912
717	PA	0091-0092
914	NY	9905-9900
		9934-9935
		9978-0079
918	OK	9932-9933

Sometimes it is possible to find the sequence or style of test number your office favors by getting a tour of the Tel. Co. facilities, and keeping your eyes open inside the central office. Try dialing variations of those Tel. Co. test numbers you may already know. You will know the loop number by the following characteristics. Every loop has:

A - One side enters into a 1000 cycle tone
B - When the other side is called, the 1000 cycle tone on the first side stops and the two are connected.

Good Luck!

We now come to tie lines. Tie lines are long distance trunks (circuits) which are rented by the Tel. Co. to large corporations (they are so expensive that only big corporations can afford them). They may extend across the city or across the country. Essentially, they allow a corporation in New York for instance, to have a Los Angeles telephone number. Thus, when a Los Angeles party calls the L. A. tie line number the call is answered in New Nork. Usually, the person who answers is a switchboard operator who will connect the caller to any number in the city where she is located. This she will do because the number is supposedly known only to authorzed personel. The only sure way to get these numbers is to know someone who works at a corporation with such lines, such as Ticketron or American Airlines.

Or you could try the ingenious ploy used by a group of college students in Chicago. It seems they took the whole Chicago phone book and fed it into a computor. Then they had the computor print out all the numbers that were not listed in the phone book. They divided these numbers among themselves and started dialing them one by one to see what they reached. Eventually, they eliminated all those numbers that were disconnected, out of order, or simply unlisted residence lines. However, in those numbers they discovered every sector tie-line number belonging to corporations in Chicago. Thusly equipped, they compiled a little black book which contained all confirmed tie-line numbers which allowed each of them to call just about any city of moderate size in the U. S. at corporate expense. I am sorry to say they were caught, though I wish I had one of their number lists.

Finally we come to call diverters. Call diverters are usually set up by big businesses which have offices in more than one city. If you are calling the office of one city which is closed, the diverter will dial the number of the other office in the other city on a separate outgoing line and connect you to it. Many of these diverters are quite vulnerable. For instance, when you call and it diverts to another office which answers, you need to wait on the line for the outgoing line to reset to dial tone. This will happen when the line is answered and the operator at the other office does not hear you and hangs up. Fifteen seconds (in most cases) later, you will get dial tone. If you are lucky, that line will respond to Touch-Tone, and you need only dial a desired number for it to go through. The bill is sent to the business with the call diverter, however, these lines are usually WATS lines (Wide Area Telephone Service) and the business is not made to pay for your call.

To find such numbers, try asking directory assistance in your area for listings of resorts or large corporations with main offices you know to be nearby, but still long distance such as DuPont Freon or a resort in Las Vegas for L.A. residents. Please send into TEL any numbers of this nature that you know or discover. Thank You. *

Pathetic Telephone

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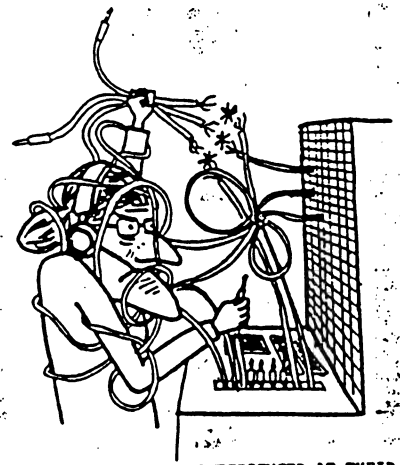

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David Rae

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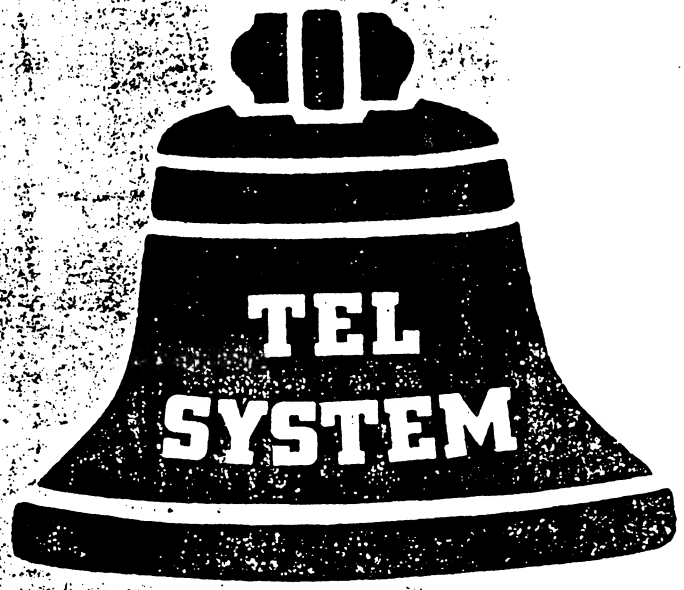

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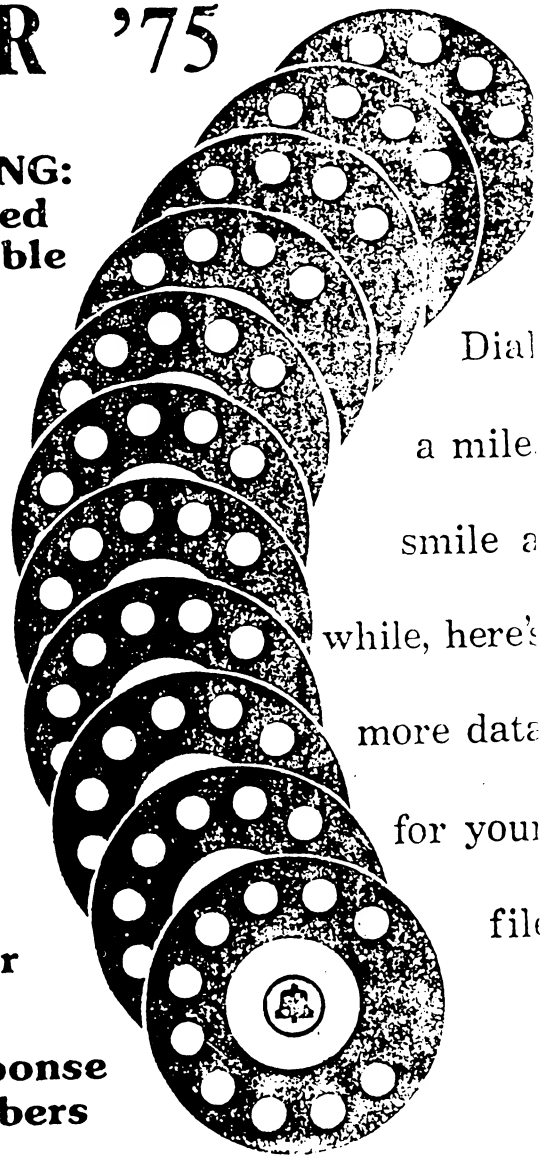

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The Old Tel

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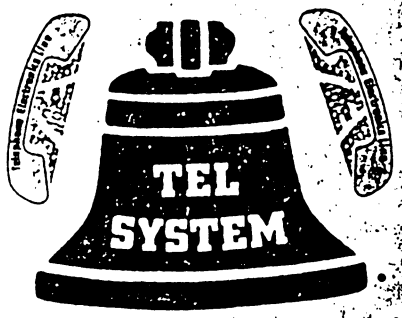


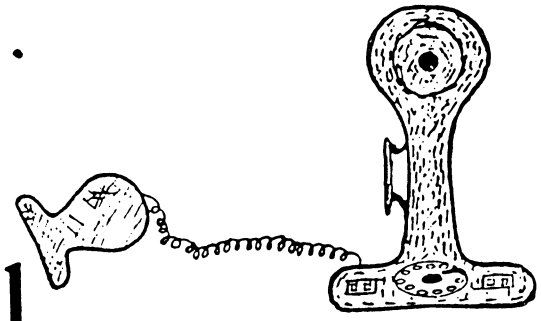
If it's TEL, it's swell!

Wishes You A Happy New Year

NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____



Editorial

By Jack Kranyak

Commercial Telephone Service (CTS) is a new concept which works very much in the same manner that television in America does. (As far as basic format is concerned). There are numerous opinions involved - both pro and con - however, at the present time, little has been done to design or develop such a system.

Imagine if CTS were employed in your city. There would be no telephone installation charges, repair charges, or toll charges. If CTS were employed nationwide, there would be plenty of free unlimited communication for all. Every telephone call would have an announcement that would "appear" on the conversation, sponsored by a local merchant. Your local calls would have local announcements, while toll or long-distance calls might be sponsored by National Airlines or Coca Cola.

Sound absurd? Not really. This concept has probably been employed by small telephone companies in the past, without success, probably due to a lack of interest with larger companies. If you ever watch American television, you will find that most stations are sponsored by commercials every five or ten minutes. Depending in the station and the viewer, programs sponsored by these merchants may range from very entertaining and amusing to extrimely dull and frustrating. Personally, I find most television shows are a waste of time and very non-educational. The occasional "specials" are the only worthwhile programs to view. (This is not an endorsement to degrade America's television and is not intended to do so).

On the other hand, the commercials may very well be another story. They inform the television viewer on current product availability and economic situations. They demonstrate advertising techniques and consumer gullibility. In addition, they bore the hell out of some suckered souls who try to watch the program inbetween commercials.

Now, if advertising were employed in the telephone industry as presently done with television, what effects would there be on the consumer and what changes would be made in the system?

In the first place, the consumer is already blessed with commercials on television. Why would it be so difficult to accept the idea of commercials on the telephone? In addition, there would be no invasion of privacy on the conversation since the advertisement would be a recorded announcement played through individual couplers into each line seperately. In addition, many different announcements (one recorded right after the previous one) on a continuous loop of tape would be used, preventing the same message from being played over and over again.

The mechanical workings of such a system would not be difficult to employ. One idea would consist of the following: Every subscriber line would have a step-up transformer connected to the Tip and Ring terminals—the two wires which constitute a telephone line. This will permit low-level audio signals from the announcement machine to be stepped-up to a higher voltage and placed across the line. Since the telephone line is current limited, a high voltage signal will produce a loud, clear audio transmission. It will also step-down signals that the subscriber produces, such as conversation or Touch Tone signals, travelling in the opposite direction (coming from the line and going into the announcement machine) to a level where it will be lost in the transformers. Although to a certain extent, this would be impossible according to formulas and theory, practical limitations will permit this type of setup to work. (Many audiophiles will testify to this when they find that their high-fidelity amplifier has a reduced bass response and a lack of treble. The blame: Their amplifier uses transformers which provide a lack of efficient coupling, and consequently have a loss in transmission).

Therefore, we learn that transformers placed across every subscriber line will couple the line to the announcement machine with good results. It will also block signals creeping back into the system and isolate the lines from themselves where no crosstalk or backtalk will be heard.

Two modifications that might prove to be adventageous are: 1). Using individual amplifiers on each line instead of transformers where cost is not a factor. This will provide maximum coupling and individual gain and output control for varied subscriber loop lengths. 2). Using either the transformers or amplifiers on line-link or trunk-link circuits, instead of on each subscribers line. This too, is a cost factor which must be taken into consideration. It would cost less to have one coupling device on each line-link or trunk-link circuit rather than on each subscriber line. Since the line-link or trunk-link circuits link calling parties to called parties, when all of these circuits ard busy, there would be no facilities to connect anyone together anyway. By placing the couplers to these circuits, the announcement will go to the actual connection rather than wait on a vacant subscriber line until someone uses the phone.

There are a few limitations that CTS would introduce into the industry. Probably the most noticable of these would put many keypunch operators out of a good job. The only billing that would be necessary is to the few advertisers who are having their announcements played on the lines. The telephone company has equipment which already calculates trunk usage for various planning and load-balance purposes. This same equipment could be used to base advertising rates. In addition, the postage that would be saved by sending at least one First Class piece of mail to each customer each month would total a considerable fortune.

Statistically, if the telephone companies were set up for CTS in the first place, based on present operating costs, there would be no more of a financial burden in operating this system than our old subscriber billing system. Again, this calculation would be derived from current expenditures on the existing system and those predicted in CTS. No actual figures will be released in this case since this is a hypothetical situation. However, it is relative to any workable telephone network, and might be interesting to see such a system in operation. It is not often that you hear what you normally watch on television on the telephone. Remember, the next best thing to being there in person is talking on the phone by long distance, whether it is courtesy of National Airlines, Coca Cola, or Ma Bell! *

TOLL: A GENERAL INTRODUCTION

By Robert Klien

In recent issues, Traffic Service Position Systems have been explored and outlined in great detail.

Now, I will attempt to outline the operations of the toll operating offices.

The physical layout of the board is best explained by referring you to Vol. 1, No. 1 of TEL (Nov.'74). A picture within that Tel issue dipicts the toll board quite accurately. On each toll board, there are row upon rows of jacks. These are called "strips" and are identified by their purpose such as a 34 tandem strip, a directory assistance strip, a no-test strip, etc. The strips are physically identified on the board by small paper strips covered with plastic in special in-laid strip holders directly above the actual jack bank. They are usually color-coded as to purpose, priority, and actual function. There are also small light indicators between label strips and jack banks in the form of round lights and bar lights. The bar lights are usually used for long-distance purposes. These lights, in the form of thin vertical strips over each individual numbered trunk, are computer-controlled to indicate which trunks are available for use. An operator will plug her cord into a lighted trunk before trying an unlighted circuit.

The other lights are round and usually used on incoming trunk circuits, such as coin, residential, etc. They light whenever someone picks up his phone and dials the operator. These lights are usually white.

The operator has a series of cords on her board for plugging traffic and verification purposes. Each cord "set" consists of a front cord, a back cord, and two lights to indicate call status for whatever circuit that particular cord "set" is plugged into. Typically, an operators board would have 20 such sets. For usual identification purposes, each cord set is marked by color. From the left, the first cord set would be coded with silver cords, white plugs, and white indictator lights. The subsequent set would have red cords, red plugs, and red indicator lights. The cords are long enough to stretch easily to the farthest jack and weighted with a special pully arrangement to allow easy and fast retraction. The cord set, in idle position, rests with both plugs straight up. The holes for the cords are only large enough to accomodate the cord itself. The plugs rest snugly against the smaller hole, held by the weight arrangement. Additionally each cord set is provided with 2 or 3 keys, of double pole, double throw on-off-on switches, used for applying ringing voltage to the front or back cords, applying talk voltage, or opening the circuit to the MF keyer for dialing on the front or back cord. Each operator is also provided with a special multifrequency keyer, which dials on trunk circuits in a method similar to our touch tone dials.

When a residential customer dials operator, a light goes on all the toll boards, on the incoming toll strip, which is identified further by a small strip denoting the first 3 digits of the customer calling such as 870, 876. An operator who is not actively engaged in a call will take her back cord and plug it into the lighted jack. While the customer waits for the operator, an audible ring-tone is sent to the customer to tell him that his call is going through.

When the operator plugs in, the light goes out on the board and the light representing the back cord stays off, while the light for the front cord goes on. The customers phone is off the hook, while the front cord is still hung-up, it isn't connected. The light is on when the phone is on the hook, off when it is off the hook.

After she plugs in, the operator will flip a key that applies talk voltage through that circuit to her headset apparatus. When the operator answers, the customer specifies the type of call or assistance needed and the operator responds accordingly.

A typical situation is: a customer claims that he has dialed a long-distance number 4 or 5 times and cannot reach the party. The operator asks for the number he is calling and the one he is calling from. She writes this information on a traffic routing ticket. Since the tickets are read electronically into billing computers at special billing centers, the operator will also mark "odd" which means he will be charged for a direct distance call. She locates the appropriate trunk strip, and a trunk marked by a thin vertical light indicator, and plugs her front cord into that circuit. Then she turns on the MF activation key, which opens a circuit from that particular cord set to the MF key unit, and depresses the KP key. A light marked ST lights to indicate that further keying can be initiated. The operator then depresses numbered keys on the MF unit, dialing the number as we do on touch tone. After she completes the ten digits she depresses the key marked ST which initiates completion of call on the far end. The light on the keying unit (ST) will go out. The light on the cord set for the front cord will stay lighted until the far end answers and then supervises (reverses). If the number called is a special Telephone Company number, or is muted, the light will stay lighted even though the ringback tone is stopped, the call answered, and conversation is going on. Operators call a line that has supervised "dark supervision" and a non-reversed line or a still unanswered number "light supervision". The operator (in a normal reversed call) will note when her front light goes out (to indicate call completion) and pull her special timer lever on her calculagraph timer mechanism which marks the time at present on the ticket, and proceeds to another call.

On 3rd party calls (calls billed to a 3rd number) the operator, after dialing the required number will call that third number to obtain billing verification. If that number is busy she will write "BY-3" on her ticket. If that number rings, but does not answer she will put "DA3" on the ticket. In either of the above cases, she will allow the call to go through unopposed. If that 3rd party answers, she will ask the answering party if they will accept the billing on a call being placed now, charged to that number and initiated by Mr. so and so.

If the party says that it's all right, she will put "V-3" on her ticket and proceed with another call, after timing that ticket. If the party refuses the charges or the operator gets a recording, such as a disconnected number, she will interrupt the call, split the parties, and ask the customer for the 3rd number again. If it is the same number, she will tell him the circumstances, and try to arrange for other types of billing. If the customer is using a fraudulant name or number, she will charge the called party. If calls are billed to a 3rd number, and it is done fraudulantly, that person can complain to his "Rep", who will have special agents investigate the billing. The method of investigation is to call the Customer Name And Address Bureau Office associated with the called area, and obtain the party's name whose number was dialed and billed to the 3rd number. Then, if the 3rd party

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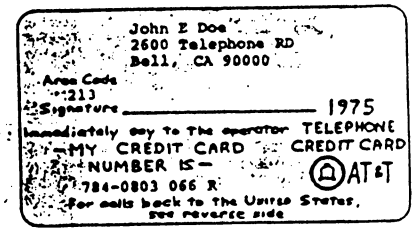
The intricacy of CREDIT CARD FRAUD

By Robert Klien

Due to the recent reader response, I have decided to write an article about an important facet in the telephone system by which you can do as well as observe. Namely: CREDIT CARD FRAUD.

The title, "CREDIT CARD FRAUD" is used to indicate that misusing credit cards for fraudulent purposes is illegal, a violation of section 502.7 of the California State Penal Code. I do not recommend that you use them, nor do I condone their usage. In these lines, I have ommited actual credit card numbers, but have included the actual code used. None of the credit card numbers printed here are real—all are ficticious.



Pictured in the above illustration is an example of a typical credit card. Note the position of the name as opposed to the 10 digit code above. I have found that pasting a cut-out of this card (above) on cardboard is a good reference, and carrying it in my wallet even a quicker guide to the right answer. Note the use of the code above. The code consists of the following elements: the 7-digit telephone number of John E Doe + a Revenue Accounting Office (RAO) code, determined by John Doe's home area code and first 3 digits of his telephone number. The RAO code currently runs from 001 to 599. RAO codes that are not within these parameters are rejected by any operator + a letter code which consists of any letter of the alphabet selected on the basis of a random, non-repeating code. Ten such letters are lined up which are then selected on the basis of a specific key check digit in the telephone number.

A typical example of a credit card number is: 784-0803 066 R. The letter code used is a 1975 series letter, and the code is non-existing in real life, although the number is an existing one in the 213 area. Existing codes may be found by testing probable numbers with the operator. To do this requires access to a Direct Distance Reference Guide (DDRG) to obtain the RAO code and a knowledge of the current letter code.

The letter code for 1974 was:

1N	6S
2X	7Q
3Z	8F
4A	9U
5G	0J

This means that a 1974 code of 788-4444 066 would have a letter code of "A", as the 5th digit is the key digit in our list.

The letter code for 1975 is:

1E	6A
2M	7W
3U	8Z
4J	9H
5Q	0R

This means that a 1975 code of 788-4444 066 would have a letter code of "J", as the 4th digit is the key digit in our list.

Here is the 1974-75 letters side-by-side.

NE	SA
XM	QW
ZU	FZ
AJ	UH
GQ	JR

We know that RAO codes go from 001 to 599—not below or above. Only the middle 4 digits of the 10-digit code are used as check digits. EXAMPLE: 784-0803-066 R, 0803 as 4th, 5th, 6th, 7th.

ZAQUJ In both 74 and 75
NXGSF In 74 but not in 75
EMWHR Replacing not used letters of 74.

Try now, to break the code. If you can establish a formula or equasion, send it in to us and we will test it to determine it's validity. We also will be working on the trying to bring you more and more of your telephone companies secrets.

Good luck on your new project. I would suggest that you collect as many good ones as you can, using them at remote pay-places. Advise friends to whom you speak of the method of communication and alert him to head off investigations confronting him concerning illegal communications by the company.

Any information, additions, or corrections would be appreciated. When writing, please refer to the volume number and # of the TEL issue, as well as the article's name. *

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Coming Next Month:

Tone Boxes (Blue & Red)
DDD Overseas
Answering Machine Survey
Telephone Systems
Dial Speed Measuring
Phone Booth Special

Telephone Electronics Line

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Modern Phone Phreaking

By Donald Simmones

From technology's standpoint, many advances have been made in today's phone system, and with these advances come advances in anti-technology; or the Phone Phreak.

In earlier days, a "Black Box" or Mute Box, capable of allowing the user to get calls for free without charging the calling party, were widely used. Along with this, the "Blue-Box", a Multifrequency Oscillating Device which reproduces the standard Bell System trunk signalling times, is capable, when used with knowledge of the correct codes, of calling anywhere in the world. An advanced Phreak can even stack trunk circuits; say all trunks between L.A. and Miami, rendering all calls between either cities incompletable. More recently the "Red Box" was introduced, capable of reproducing the sound of electronic coin beeps (2200Hz) generated by the new Western Electronic single slot pay telephones (IC types).

Armed with these 3 basic devices, an average Phone Phreak can cause thousands of dollars worth of free telephone calls, interception, and endangering of communications. It is entirely feasible (and has been done) to tie up all the trunks leading into and out of an entire city such as Bakersfield in less than 45 minutes, rendering it hopeless due to lack of communications.

With more skills, and knowledge of very complex and secret codes, it is also possible to tie up all overseas circuits, satellites included, to declare secret Military conversations, or even to monitor calls to and from the White House. The ultimate would be to, with the proper frequencies and codes put missle installations on standby alert, and activate the Conelrad Emergency Defense Systems.

Because the abilities menthioned above are so dangerous most illegal calls should be based on some elaborate pre cautions.

1. Tell No One that you have tools of, or are a Phone Phreak. If nobody knows about you, then you will not become suspect due to tips, rumors, and the like.

2. Do not Blue Box from your home telephone. This is too dangerous due to the advent of certain detection techniques.

3. If you Blue Box, do so from Pay Phones only. Select your pay-phones on a random basis so as not to leave a pattern as a basis for your capture.

Some very cautious Phreaks even install thermite bombs in their Blue Boxes, which, when detonated, will reduce the Box to "Metal Soup" laced with "Plastic Spice". This, no electronic components exist to be reconstructed in a lab and then used as evidence for conviction.

In any case, the Phone Phreaks can and do take advantage of each advancement in the Bell Systems elaborate technology With every new device or service introduced by the Bell Systems, the Phone Phreaks intriduce their counterpart designed to break it down. The Phreaks even have a network of Bell System employee/spies as good as or better than the Special agents posing as Phone Phreaks. It is notable, however, that Phone Phreaking becomes harder with each passing day. Rising complexity of the telephone network demands a corresponding rise in the technical competence of the Phone Phreak, a fact which tends to take it from the hands of the general public and leave the illegal stuff up to the technically skilled. In the long run, most outstanding Phone Phreaks find that crime does not pay indefinately. *

LETTERS

FROM THE READER

Gentlemen:

I am a new subscriber to your wonderful little magazine, and I am hoping that there is a way in which the pages of it can be used for what I believe should be a very constructive purpose.

You see, at the outset Thomas Edison could have taken the same attitude Bell System has taken all along concerning what they term as "foreign equipment". From the purely technical standpoint, the arguments used against interconnecting equipment with telephone lines would be far more valid if applied to power company lines. However, very wisely did this industry start off in a much different direction, with the result that the number and variety of pieces of equipment which use electricity grew at a fantastic rate such that the use of electricity doubles every ten years.

The obvious result is that it made a vast number of business and job opportunities which are, today, simply an accepted part of our society, and has contributed toward the building of what has been termed the richest nation in the world. A spirit of extremely good cooperation existed all around and a very good safety code was developed, and everything was done to disseminate as much scientific and technical information on electricity as possible to interested students, even down as far as the Junior High School level. People were encouraged to invent and develop new ideas and new businesses.

Setting forth this as an example to the telecommunications field, it is my hope that the Bell System can be persuaded to do a 180 degree turnaround and to adopt a similar philosophy: to disseminate as freely as they possibly can to interested students, all the way down to the Junior High School level knowledge of the science of telephony, and to encourage inventing in this field. You see the development of new ideas and new pieces of equipment which will work in conjunction with the telephone system. These developments should be taking place in a spirit of full cooperation and should serve to greately increase usage of the system. Much more so during those "off-peak" times when phone companies practically beg people to make long-distance calls, creating many new business and job opportunities for a great many people. This could do much to help this country get out of it's present economic situation, helping to create many more hard-working taxpayers to help our Uncle Sam carry his present burden. I am hoping you can give my ideas some thought, as I am sure some of the top-level management in the phone system read it also.

James A Davis
Philadelphia, PA 19120

Dear James,

You have an excellent idea. The current situation with Telephone Company rules and regulations still stands where it stood years ago—nowhere—as far as the customer is concerned. What you have brought to our attention is unfortunately true and prevents many new opportunities and ideas to develop. The Telephone Company has perhaps too much control over the Peoples communications media and it is up to all concerned to protest and bring to the attention of the law-makers this problem. After all, telephone service is for the public who should be able to use it to the fullest.

Dear Sirs,

When a relative asked to use my telephone I was not at all suprised as she was on the first leg of a very long trip. However, when she placed a person-to-person call to herself my eyebrows raised to say the least. It was soon clear that she was conveying information without it costing a single cent. Her two oldest children were at home and the call told them she had completed the first part of the trip and were safe at our home. They of course, told the telephone operator the called party was not at home. I soon found that a wealth of information could be conveyed in this manner providing a code of existing and non-existing names were compiled ahead of time. A call to the 3 months old baby for example, would advise of a two day stopover and everybody safe and well.

A system used by High School Students was also simple but effective. Each call was placed from a pre-designated pay telephone booth. The student would dial his or her home telephone number and let the telephone ring ONLY ONCE. As virtually no telephone calls are made with one ring, the parents would know the call was from the student and would immediately call the number of the pay telephone booth. The student of course was waiting to accept.

Edward V. Pelissier
Hermiston, OR 97838

Dear Sirs,

I am a new subscriber to TEL. I would like to contribute some information that might be newsworthy to your readers. There is a nationwide number that anyone can dial for the latest medical reports, transportation reports, news service for H.U.D., and National Dept. Of Regional Councils. These numbers are:

U.S.D.T.	1-800-424-8807
H.U.D.	1-800-424-8620
N.D.R.C.	1-800-424-8500
A.M.A.	1-800-424-8620

The above numbers are all nationwide. You can call WATS information for further reference on these numbers. The number for WATS information is 1-800-555-0000. The U.S.D.T. changes its recordings every day along with the N.D.R.C.; A.M.A. changes their tapes every Monday and I don't know when H.U.D. changes theirs.

Abbreviations used in this letter:

U.S.D.T.-United States Dept. Of Transportation
H.U.D. -Housing And Urban Development
N.D.R.C.-National Dept. Of Regional Councils
A.M.A. -American Medical Association
WATS -Wide Area Telecommunication Service

Tod Harris
Potsdam, NY 13676

DETECTION: How to avoid it

By David Rees

Many of you have probably read various magazine and newspaper articles about people who were caught and convicted for the fraudulant use of a Blue Box. Naturally this leads us to ask, "How were these people detected, and what methods does the Phone Company use to catch Phone Phreaks in the act?" Actually, the Telephone Company has a hard time locating and collecting enough evidence to catch and convict a Phone Phreak, and is immenely difficult. The small percentage of Blue Boxers who are caught and convicted for the most part represents those who were not cautious or careful enough when committing the act of fraud by wire.

There are three major systems of detection used by the Tel. Co. in order to single-out the Blue Boxers from among the multitude of average telephone callers. Each method of detection will be discussed separtely and a countermeasure will be suggested.

THE INFORMER

Probably the most effective and certain method of Phone Phreak detection used by the Bell System is the leak of information from a source one might call a fink, stool pigeon, informer, or some other derogatory phrase. Some famous last words for many Phone Phreaks are "I can trust him he wouldn't tell anyone". Even the most trusted friends may decide to inform on you under the right circumstances. It is my understanding that the Bell System's favorite practice is to catch a Phone Phreak and they offer "immunity" if he will inform on his Phone Phreak friends. When faced with such a choice, few will "take the rap" on their own. Armed with this information, the Security Agents for the Tel. Co. write up "Black Lists" containing information on who to watch and how carefully to watch them. On this basis, 2600 Hz detectors and other devices may be issued at the request of the Telephone Company.

THE 800 OVERDOSE

The Phone Company keeps a careful watch on everyone's calling records. They maintain a subroutine in the computer program which handles billing that looks for an unusually large number of 800 area code calls or 800 calls of unusual duration. When it comes across a record with these discrepencies, it is printed out with a special note to security agents. On a few occasions the Phone Company has made a computor print out of all 800 calls made from a particular number if that number has made more than fifteen 800 calls per month, or has been connected to an 800 number for periods of time longer than 15 minutes each. The most effective remedy for this method of detection is to make all Blue Box calls from pay-telephones. However, if you are set on making such calls from your home phone you should meet certain guidelines. Do not make too many Blue Box calls, or any of long duration. If you need to call for long periods of time dial a nearby area code which has a very low rate associated with it and Blue Box off of it. Though it is not free, a call to New York from Los Angeles at Los Angeles to Anaheim rates represents quite a savings.

TROUBLE LOCATING EQUIPMENT

In most end offices and especially in major toll centers and long haul trunk facilities, there exists automatic trous-

continued on page

AREA CODE 900 -it's not only a mass calling number

By John Reynolds

e event which highlighted the need for a special mass call-
area code was the Nixon-Humphrey debate in Los Angeles.
ly two telephone numbers were given on the screen to re-
ve questions to be answered. This resulted in a very low
mber of completed calls to these numbers compared to the
mber of attempts made. A large number of callers were
ing circuits and reaching reorder. Area code 900 was de-
med to allow the customer to use as little central office
uipment as possible before recieving reorder.

arting with the originating end office, each office directs
0 calls to only two trunks. This process continues to the
xt higher class office until a 4A XBar machine is reached.
each 4A four trunks are avaliable to the terminating office.
the terminating office is unable to handle this, four trunks
om each major 4A, the number will be reduced even more.
us, the number of available circuits can be controlled to
event overloading the DDD network.

e have listed the prefixes and their locations along with
e MF central office codes. Most of the time the access to
ea code 900 will be turned off and you will not get through.
e charge to call a 900 number is the same as a regular
mber in that area code. THESE NUMBERS ARE NOT FREE!
you know of any valid numbers please send them in and we
ill publish them. Try everything with area code 900. Many
mes the circuits will route you to strange places. Recently
Los Angeles you could call any regular number with 900
d get that number in LA, but at no charge. This has been
orrected but you can try it where you live. *

CO Code	State	City	Bus. Ofc. Code	NPA Opr. Code	V	H	RAO Code	Actg. TC Code
20	IN	Indianapolis	11	317+	6272	2992	080	3865
22	CA	Sacramento	15	916+	8304	8580	160	7059
30	FL	Tampa	11	813+053	8173	1147	531	7881
32	MD	Baltimore	11	301+	5510	1575	011	0441
40	FL	Jacksonville	21	904+	7649	1276	056	3949
42	DC	Washington	10	202+	5622	1583	032	8440
43	NM	Albuquerque	27	505+	8549	5887	102	0083
47	CA	Fresno	28	209+004	8669	8239	289	2907
260	AZ	Phoenix	22	602+	9135	6748	064	6361
263	PA	Philadelphia	18	215+	5251	1458	041	6339
280	PA	Harrisburg	15	717+	5363	1733	027	3405
330	FL	Ft Meyers	10	813+046	8359	0904	315	2787
333	PA	Pittsburgh	10	412+	5621	2185	030	6407
340	FL	Tallahassee	33	904+038	7877	1716	056	7869
370	OH	Akron	12	216+042	5637	2472	050	0043
390	GA	Macon	58	912+046	7364	1865	316	4777
421	WA	Seattle	34	206+	6336	8896	163	7361
434	ND	Fargo	11	701+	5615	5182	133	2637
450	FL	Orlando	32	305+022	7954	1031	180	6049
478	CA	San Francisco	10	415+055	8492	8719	158	7217
520	CA	Los Angeles	32	213+	9213	7878	184	4672
521	CA	Los Angeles	32	213+	9213	7878	184	4672
540	GA	Atlanta	22	404+	7260	2083	035	0335
541	NC	Charlotte	10	704+	6657	1698	319	1359
550	FL	Miami	15	305+007	8351	0527	044	5165
567	CA	San Diego	10	714+042	9468	7629	164	7198
571	NC	Greensboro	16	919+037	6400	1638	036	3215
576	MO	Kansas City	14	816+	7027	4203	144	4081
578	OH	Cleveland	10	216+	5574	2543	082	1539
591	IL	Chicago	15	312+	5986	3426	097	1409
645	ONT	Hamilton	53	416+036	5097	2504	478	9081
670	QUE	Quebec	11	418+	3682	1896	471	9211
690	OR	Portland	10	503+	6799	8914	131	6559
697	ONT	London	90	519+	5264	2657	484	9101
749	OH	Cincinnati	10	513+	6263	2679	077	1447
762	CA	Oakland	13	415+	8486	8695	167	5885
770	SC	Columbia	29	803+	6901	1589	189	1639
790	QUE	Montreal	24	514+	4127	1992	470	9205
842	CA	Bakersfield	18	805+029	8947	8060	255	0433
850	MI	Detroit	10	313+	5536	2828	083	2101
870	ONT	Toronto	45	416+	4981	2488	476	9152
880	AZ	Tucson	26	602+059	9345	6485	064	8101
890	WY	Cheyenne	10	307+022	7203	5958	137	1401
921	WV	Charleston	21	304+	6152	2174	034	1349
924	WI	Milwaukee	10	414+	5788	3589	088	5249
928	WI	Madison	10	608+	5887	3796	201	4801
931	MA	Boston	13	617+	4422	1249	008	0817
937	CA	Santa Ana	37	714+023	9267	7798	182	0189
985	NY	New York	23	212+	4997	1406	074	5757
987	CT	Hartford	18	203+022	4687	1373	020	3425
999	NY	New York	23	212+	4997	1406	021	5757

DETECTION continued from page 7

detection equipment. In Crossbar 5 offices and 4A toll tandems, the trouble recording equipment consists of an elaborate sensory network of wires and relays associated with all common control equipment in the office. This network is linked to a diagnostic device which punches appropriate holes in an IBM card to indicate to the switchman or office attendant the location and nature of the problem. In electronic switching offices (ESS, EAX, etc.) the central computer which controls all switching in the office is equipped with diagnostic subroutines which constantly check for various trouble conditions.

All of this weighs heavily against those who make fraudulant calls. In ESS offices, clearing a trunk (clear forward) with 2600 Hz causes the teleprinter in the office to print out a "spot reversal" indication about that line. In addition, it prints out the calling number as well as the called number. When noticed by a switchman this spells out trouble. In some 4A and 4M TDLL centers the equipment looks for this "spot reversal" condition on its trunks. Also indicated is the incoming trunk number which can be traced back by calling the originating office or checking billing records at a later date.

If you box from your home phone, the inevitable result is that you will eventually be detected.

The safest way to Blue Box is from a pay telephone. When doing this, it is suggested to pick your pay telephones on an entirely random basis. Do not make calls from an isolated and pro-selected group of pay phones with in your specific area. Move around a great deal and try to use phones well outside the neighborhood in which you live. Some unfortunate Phone Phreaks who frequent a specific group of pay phones have been nailed by stake-outs of FBI agents.

When you box from the pay phone, assume that the conversation is not private. If you happen to be detected by a Tel. Co. Switchman, he may trace the call and notify security to come and apprehend you. This is a combersome process, however, and it usually takes more than 30 minutes.

Beware that a recent law permits the Phone Company to use 60 seconds of tape-recorded conversation without your knowledge or permission in court if used as evidence in your conviction. Both parties may be convicted on an equal basis if both parties were aware that they were involved and the cause of avoiding lawful toll charges. *

TEL Tips

From the reader

STOP THOSE CRANK CALLERS

Build a beeper box to emit a duplicate of the Telephone Company recording beep. Thats it. People freeze up when they think they are being recorded, especially storm window salesmen. Once they are off balance it is easy to either play with them or get them off your line. This is much more economical than actually recording and a lot more fun.

HOW TO MAKE YOUR OWN JACKS

Recently many phone companies switched from a square receptacle to a round receptacle for terminals and jacks. At the present time jacks that will fit the new rounds boxes are almost impossible to find. There is a way however, to make your own jacks.

First, obtain a round cover plate and metal ring. These can be obtained from your repairman "to cover those holes you found when you moved in." The ring can be installed in a sheetrock or paneled wall by mouting with two dazy 1/8" hollow wall anchors. Then the center is cut or drilled out with a hole saw. Make sure the anchors are flush with the wall surface before installing the ring. Now you are ready to mount the cover plate, terminal or jack.

The jack itself is made by drilling four appropriately spaced holes in the plastic cover plate. You may have to buy a surface mounted model to use as a template. Be sure that you have the correct holes on top as the many Japanese jacks are marked upside down.

Next manufacture the contacts by winding a long spring on a heavy coat hanger or similar rod. This jig must be slightly smaller than the plug prong as the spring will expand after winding. Use spring brass wire. Wind a second spring, but in the opposite direction. These two springs will nest together and form your contact.

Cut four lengths of the heavy spring [illegible] in a plastic straw. On either end of each contact assembly unwind about 0.25 inch of wire. This will hold the spring in later steps.

Now place a commercial or Telco plug through your drilled cover plate. Slide the four contact assemblies on the four prongs on the back. Put a ring of masking tape or similar material around these contact assemblies and pour in a potting compound, epoxy, etc. This will be the back of your jack and so it must fit into the hole in your wall. Be sure the compound you picked will adhere to the plastic cover plate. After drying the plug is removed. Make sure the plug does not get glued into the jack. You may try silicone spray on the prongs.

Solder your connections directly to the spring or use Fahnstock clips for quick installation and removal.

EXTRA PHONES

OK, you don't want to become an electronic whiz, you just don't want to be caught with a phone in each closet and the bathroom to boot. The best way to get caught is to go to extremes in the first place and screw up your line and the second is to have wires leading all over your residence from the protector. A repairman will be suspicious of the latter especially if you have only one official phone. Take your line(s) from the middle of theirs and hide the connection under insulation (repairmen hate insulation) or under the family cat or anywhere--just hide it. If possible, use approved connectors and grey tape to allay suspicion. Another method of concealment is to install a maze of wires to each room as a camouflage.

Back to extremes. If you don't want to construct an electronically safe connector there is an alternative... go mechanical. Install a switch in each of your 40 phones to turn off the bells as a minimum precaution. Safer is a switch to take the unit off line completely. Use a DPST miniature slide switch on the bottom of the unit. These switch levers are easily filed down so that they do not hang down so far as to switch themselves on as the phone is moved. Better yet, install the line switch on the cradle so that the phone is on line only when the handset is being used.

Remember a little precaution is better than a large backcharge and possible loss of service.

OPERATOR-May I have the Area Code for...

The next time you have nothing to do you can call your friendly "O" operator and ask her for the area codes of these communities. All of these exist and Ma Bell has an area code for each one.

Georgia	Florida	California
Arp	Bell	Agnew
Ball Ground	Belle Glade	Angels Camp
Camp Dixie	Camp E-chock-o-tree	Azusa
Chickamauga	Chose	Ben Hur
Climax	Cocoa	Bowles
Dial	Fruitland	Brawley
Dry Pond	Fruitville	Butte City
Experiment	Geneva	Earp
Fairyland	Hole Sound	Fern
Fish	Holiday	Happy Camp
Fry	Kissimmee	Lucern
Gay	Little Torch Key	Mecca
Good Hoper	Old Town	Nice
Loco	Plant City	Nut Tree
Meansville	St. Cloud	Olive
Pitts	State Prison Farm	Perris
Social Circle	Sugerloaf Key	Pollock Pines
Temperance	Titusville	Railroad Flat
Ty Ty	Treasure Island	Tranquility
Zenith	Venice	Volcano

Try not to get your fish and your fry or your fruitville and your fruitland confused. *

TOLL continued from page 4

still doesn't know that person, they will call that party and try to find out who called at that time and date. If they do find out they will try to locate that person, and bill and/or prosecute him.

For all you phone enthusiasts, there are certain numbers that exist as test numbers for the Telephone Company that are always busy. They may be found by logistical dialing and certain knowledge of Telephone Company test codes. For example, the permanantly busy number dialed on crossbar and ESS systems in New York is 212-XXX-9970. XXX represents the first 3 digits of the X-bar or ESS system.

The New York code will also work in most parts of N.Y.S. using different area codes and prefixes. I would suggest for your security purposes, that you always use pay-telephones on a random basis, and that you make a list if all working prefixes and area codes that are permantly busy. Also alter your usage of them on a random basis in conjunction with your random selection and usage of pay-phones. If a random pattern is produced, even in times called, the Phone Company will be discouraged from investigating, as they have no one to talk to. The called party can always claim that they recieved a prank call and they leave their phone off the hook. This claim will be supported by the random nature of the calls. A last word concerning 3rd party calls, be sure to instruct your distant friend whom you are calling on now to deal with the Telephone Company. *

Back Issues are available for $1.00 each. Unrevised, untouched, original copy sent by first class mail in a manila envelope. Specify Nov. (TSPS) or Dec. (Toll fraud) copy.

onstruction Project

By Jack Kranyak

THE HOLI BUTTON

INTRODUCTION

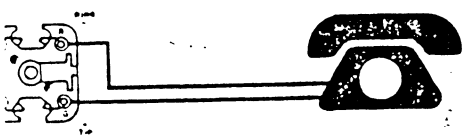
you ever attempted to run across the house and an- the extention phone before the calling party disconnects. will unavoidably happen when someone calls, you answer hone, and wish to speak on another phone in the privacy ur own bedroom. You have a choice of telling the calling to hold on while you dash across the hou and answer xtention and dash back to hang-up the first phone and a third time to speak with your party. Or, you can hang e first phone and dash just once to the extention phone nswer it within fifteen seconds. (Most phone companies ide the called party with fifteen seconds of "reset" or e-out" time after the phone is answered. Therefore you robably notice that you can "hang-up" on your friend for ng as fifteen seconds and he will still be at the other end you answer again). This can, at times, be very annoying u have a large home and your extention phone is in the tree e out back. In addition, if you have an office with the e problem, it would be a poor idea to go darting and dodg- through the corridors to answer the other phone all out reath, hoping your client is still on the line!

UTION: Call up your local telephone company business e and request a key-phone installation with hold fea- s. Of course, you will want lamps that indicate who is old. The approximate time for such an installation to rdered and installed may be as much as three or four ks.

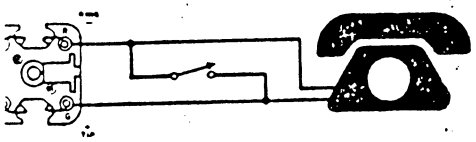
OTHER SOLUTION: Build one yourself. It will provide with four accomplishments: a savings in time, a savings cost, a knowledge of the telephone system, and the sonal satisfaction you will get from doing it yourself. Not ention outwitting Ma Bell at all of the above—it will take evening to install and cost approximately five dollars. (Ma l will charge as much as $250.00 to install it). You will rn what key-installers take a trainee course for six nths to learn. in one evening, and you will have the am- on to go on to bigger and better things.

CIRCUIT DESIGN

nsider the telephone circuit. The telephone is connected he line by two conductors:

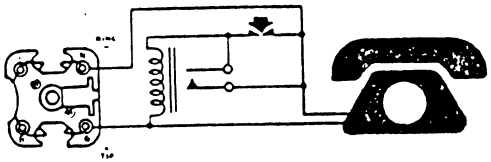


you were to have a hold button in the circuit, it would look e thus:



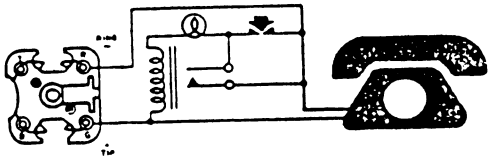
his type of hold circuit is by far, the simplest and easiest install. It will put the party on hold when the switch is osed and take the party off hold when the switch is open. hen the switch is in the hold position, the telephone may hung up and the party on the other end will not disappear.

'S DISADVANTAGE: You cannot operate the hold button from remote location. You must have a hold button at every lo- ation you wish to activate the hold from. And all hold switches ust be turned off to take a party off hold. This means that ou still must run around the house flipping all the hold switches that are on, to the "off" position in order to hang up and dial another number. This is the disadvantage that this particular hold button has, and may be corrected by employing the following circuit:



This circuit works on the principle that the 48 volts normally found on the telephone line will hold the relay down, thus holding the line, until the telephone instrument is answered, consequently robbing the relay circuit from sufficient power to be held down. It's a simple circuit and found to be quite effective. A seperate hold may be installed at every location where holding features are required. One thing to remember: this type of hold operates on a voltage-sensitive system. (I.E. the voltage drop across the line when the telephone becomes off-hook and requires more power is insufficient to keep the hold relay down). Consequently, if there are excessive loads present on the line, or if too many holds are activated on the same line at once, the hold relay(s) will open.

If the party that calls you is placed on hold, becomes impatient and hangs up, the hold relay will turn off automatically fifteen seconds after the calling party hangs up. Your telephone will be in a normal condition ready for standard operation. If lamps are desired to indicate when a party is on hold, the following circuit will provide this option:



Be sure that a lamp requiring very minimal current is chosen, as this too is a factor in determining relay sensitivity. Another option includes blinking lamps. There are many methods used to produce this visual signal. The Phone Company uses a device known as an interrupter. The interrupter is an electromechanical device operated by a motor which turns cams that activate relay switches. The interrupter contacts would be wired in series with the lamp.

PARTS LIST

The basic parts that are required to build the hold button are a relay, a pushbutton switch, and a lamp.

The relay may vary from the standard 600 Ohm telephone-type relay. This is due to your location from the central office and various line loads on your telephone line. You must experiment with different types of relays and might try placing a potentiometer in series with the relay coil to adjust sensitivity. Probably most often, a 600 Ohm relay at 24 volts will do the job. Again, try experimenting with different relays until a satisfactory one is found. (A Radio Shack "Relay Suprise Pack", for example, is an excellent source of relays).

The pushbutton switch may be an SPST, momentary con.type.

The lamp may be any value, as long as relay operation is not effected. Usually, 2-3 volt 50ma is sufficient.

APPROXIMATE CONSTRUCTION TIME: One hour.
APPROXIMATE CONSTRUCTION COST: $5.00. *

now available for the telephone experimenter

COMPLETE CONSTRUCTION PLANS

TELEPHONE PLANS: $3.00 each.

Answering Device
Automatically answers the ringing line, plays a pre-recorded announcement, takes the calling party's message, and hangs up.

"Black Box"
Device that the FBI uses to wiretap and moniter telephone conversations silently, from a remote location from the phone.

Call Limiter
Stop those long-distance calls made by your friends! Device disconnects all long-distance calls from your telephone line.

Central Dial Exchange
Now you can call the other end of your house on your private telephone system. Great for the office without a PBX system.

Recorder-Actuator
Now you have the capability of recording telephone conversations automatically every time the phone is in use.

Schematics
The basic schematics and parts lists for commonly used telephones. Includes a description of the telephone network.

Telelink Burgler Alarm
Use the telephone line as a link to notify you when intrusion occurs. Great for babysitting purposes and remote applications.

Automatic Dialer
Automatically dials a stored number in its magnetic memory. Takes Touch-Tone or Dial and stores hundreds of numbers.

Call Diverter
Answers the ringing line automatically and dials a pre-recorded number to divert the original call to a remote location.

Conference Bridge
Automatically puts your friends on a giant conference as they call in. Have three or four way calls from your home phone.

Melodic Ringing Generator
Add harmony to your phone. This device eliminates conventional ringing and produces a melody with each ring cycle.

Remote Control
Before you leave work, call your home and utilize this device to turn on the stove and heat your dinner. Avoids burglars too!

Speakerphone
Enjoy hands-free conversation on the Speakerphone. Similar to Bell System type, but uses two-way transmission instead.

Voice Scrambler
Talk and listen to your friends in the normal manner, but good luck if someone else tries to moniter the conversation.

ELECTRONIC PLANS: $5.00 each.

Biofeedback Conditioner
Moniter the fluctuations that your brain produces and learn to put yourself in any mood desired. Completely harmless.

Multifrequency Encoder Network
Control over telephone line from this pocket-size unit. Learn to manipulate your telephone and speed calling rates by 500%!

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Stimulate plant growth as much as 300%. Can be used on a particular section of the plant or on the entire plant itself.

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Dodecahedron Speaker Enclosure $7.50.
Unique twelve-sided enclosure enhances response from any speaker. Unusual design adds to any home decor. A must for the audiophile and design engineer.

Photographic Pinhole Camera $3.00.
Small, compact, easy to build camera costs only the price of the film cartridge. Plan includes proper exposure setting tables and film types that produce best results.

THE LEGAL ASPECTS OF INTERCONNECTION

The complete reference book on the legal rights of the telephone customer. $29.95, postpaid.

This book is still in the production stage and will include the latest laws and regulations up to and including the end of February. Know exactly when and where the telephone company has the right to enter your home to inspect their lines. Know exactly what illegal telephone equipment consists of and when it is actually considered illegal. Know exactly what YOU, the telephone customer, may do to fight back at the phone company should there be any question in your service. In addition, technical aspects of the law will be discussed. This material has not been published in TEL.

ALL OF THE CONSTRUCTION PLANS ABOVE ARE AVAILABLE FOR $24.95. WITH "LEGAL ASPECTS" BOOK, $49.95.

TELETRONICS COMPANY OF AMERICA, 22035 Burbank Blvd., Woodland Hills CA 91364 USA

// LEARN WHAT THOSE LITTLE CODE NUMBERS AT THE TOP OF YOUR TELEPHONE BILL MEAN TO YOU.

// HOW ARE YOU SO SURE THAT YOU WILL GET A DIAL TONE EVERY TIME YOU PICK UP THE TELEPHONE HANDSET?

Telephone Electronics Line

VOL 2, NO 2 • FEBRUARY 1975 • FIFTY CENTS

Isn't it a pity when no one's at home... ...in such a large city to answer their phone—

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Old Tel

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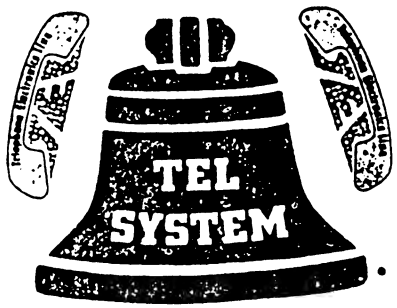
e continue to grow with your support. In fact, we'll be expanding volume 25% by next issue. In addition, you will enjoy following the multi-color diagrams, and larger cleaner type. We ask that you become an agent for TEL and sell a subscription to someone you know!



f it's TEL, it's swell!

DUE TO READER RESPONSE AND NUMEROUS REQUESTS CONCERNING THE MAILINGS OF *TELEPHONE ELECTRONICS LINE*, WE HAVE DECIDED TO INITIATE A SPECIAL SERVICE THAT WOULD SPEED THE DELIVERY EACH MONTH OF *TEL* AND DISGUISE THE FRONT COVER AND THE CONTENTS INSIDE. THIS WOULD BE OF ADVANTAGE TO YOU IN TWO WAYS: FIRST, IT WOULD INSURE DELIVERY OF *TEL* JUST A FEW DAYS AFTER THEY'RE OFF THE PRESSES AND SECOND, CURIOUS POSTAL AUTHORITIES WOULD NOT HAVE A CHANCE TO GLANCE AT THE EYE-CATCHING FRONT COVERS OF *TEL*.

THIS SERVICE IS CALLED *FIRST CLASS MAIL*. FOR A FLAT RATE OF $12.00 PER YEAR (NO MATTER WHERE IN THE WORLD). WE WILL MAIL EVERY ISSUE IN A PLAIN MANILA ENVELOPE WITH NO SPECIAL MARKINGS ON IT, EXCEPT YOUR ADDRESS.

AME _____

DDRESS _____

ITY _____ STATE _____ ZIP _____

TAD TELEPHONE ANSWERING/RECORDING DEVICES

BY FRED BLECHMAN

This is a fast world we're in today, and the telephone is an essential part of business and social life. A missed call can cause a small businessman to lose a large order. A housewife could miss a social appointment change. A salesman could miss contact with an important prospect. A professional could lose a client.

The Telephone Answering Device (TAD) answers your phone when it rings and let's the caller hear your programmed message. Just as the caller hears YOUR voice, you hear HIS. You receive the message he leaves, first hand, and can judge his frame of mind as accurately as if you were actually talking with him. You hear ALL he says, and exactly WHAT he says, with no third person involved.

Small businessmen, salesmen, professional men, busy housewives and scores of others depend on the telephone. The TAD fills in when you step out by automatically taking the messages, orders or appointments that would otherwise be missed. For the small businessman, the TAD may save the expense of secretarial help or prevent loss of business and prestige when the telephone goes unanswered. Calls from salesmen, distributors or customers can be answered automatically, and accurately, any time of the day or night. For the professional, reliable and accurate messages mean good relations with patients or clients and proper handling of emergency situations. Executives, when in conference or absent from their desk, can advise the caller of later availability. Salesmen can accept orders when out "prospecting". Housewives can route important calls to a neighbors phone or check messages and return calls immediately after shopping or dropping off the children at school. Young people can schedule social appointments without waiting at home for a call. In short, a TAD can be an asset to anyone who has a telephone - 24 hours a day, 7 days a week, without complaint, vacation, coffee breaks, or errors!

ANSWERING SERVICES

"Yeah", you say, "but how about a Telephone Answering Service?". An Answering *SERVICE* is an operator who takes messages and repeats it to you when you call back. The problems with this, however, are the "*human*" element. The message repeated back to you can be incomplete or incorrect - it's amazing how much can get lost in the "translation"! Also, a busy operator keeps the caller or subscriber waiting while she handles other calls at her switchboard. And, who wants to leave a personal or complicated message with an operator? The TAD repeats the *EXACT* message, with the voice and emphasis of the caller. Not only that, but a TAD will usually pay for itself within a year as compared to the monthly cost of an Answering-Service.

COMPARISON CHART

Okay, let's say that now you're convinced you can't live any longer without a *Telephone Answering Device*. How do you find out about them? Where can you get them, and how much do they cost? What are some of the features that are really worth something, and what "features" are just "window dressing"? Well, to solve your dilema, we've provided an in-depth Comparison

ıart that shows the details of 25 ıits.....and to help you understand e chart, we're going to discuss .ch column briefly:

COLUMN 1

anufacturer or Distributor: Write ere for more information, and the cation of your local distributor. or any unit selling above $250, you ıould ask for a demonstration. On ss expensive units the profit is ften too low to allow direct selling,) they are usually sold by mail, ith a guarantee of satisfaction.

COLUMN 2

lodel Name & Number: Sometimes ou'll find identical machines under ifferent names. For example, the ınsaphone 540 (no longer available rom Dictaphone, except from exist- ıg inventories) has shown up more ecently (with improvements) as the anyo Answer Man and the Code-A- hone Model 360. Also, model hanges occur frequently; since the Chart was drawn up, Phone-Mate 100 to a Phone-Mate 400s, with a witch to disable the monitor, an im- provement at no extra cost. So watch for model changes.

COLUMN 3

Suggested Retail Price: The prices shown are those furnished by the sources listed. However, prices vary around the country, especially on the higher-priced units, where there may be some room for bargaining with the salesman - he may be will- ing to give up some of his commis- sion to make the sale on the spot.

COLUMN 4

Maximum Outgoing Message: This could be very important to you. Under normal conditions of use, 18- 30 seconds is plenty of time for you to tell the caller, in your voice and words, that you are not in, and to leave a message. But you may want this unit to give a sales pitch, re- cite your business hours, give a mess- age-of-the-day, redirect calls to where you'll be at certain times, announce a schedule or menu, or any of a thousand uses that might take several minutes.

COLUMN 5

Variable Length Outgoing Message: Here, again, it depends on your in- tended use. A fixed outgoing mess- age time is usually fine; but variable length gives you a lot more flexi- bility. With variable length your in- coming message can start immediate- ly at the end of your outgoing mess- age, as long as it may be.

COLUMN 6

Maximum Incoming Message: If all you expect to receive is a name, phone number and short message, 24 - 30 seconds is good enough. But if you expect detailed informa- tion, long orders, dictation, field re- ports, etc., then look for a longer incoming message.

COLUMN 7

Maximum Messages: This may con- fuse you but, it's based on the most messages of the shortest length. For machines that shut-off automatically after a person hangs up (see col. 8) we've used 30 seconds as the average message length, incoming. *NOTE:* Columns 5,6, & 7 reflect manu- facturer's data, which change with technology. Those machines using standard cassettes (Footnotes A&H) may have longer capability than spe- cified if C-120 or C-180 cassettes are used. Figures shown are based on C- 90 cassettes.

COLUMN 8

Voice Activated: This feature pro- vides automatic shut-off about 12 seconds after caller stops speaking or hangs up. It allows the incoming call- er to leave his whole message, in- stead of perhaps cutting him off, as the fixed-time units might. This might be very essential for your use.

COLUMN 9

Automatic Level Control: This boosts the volume on a soft-spoken caller, or bad connection, and cuts the volume down when it's too strong. This is certainly a desireable feature, especially since some people are scared to death of talking to a machine, and either hang up or speak very low. Improves outgoing messages, too.

COLUMN 10

Call Received Indicator: When you return, after leaving your TAD to an- swer the phone, you'd like to know if there are any messages. Without some form of call indicator, all you can do is rewind the tape and play it back. With some type of indicators (light or flag), you can only tell that at least one message has been record- ed, but you can't tell how many. With a tape counter, there are a cert- ain number of digits the counter moves for each message, so you can tell the number of calls received, and you can "fast forward" to the next call on hang-ups. A call counter, of course, counts the number of calls re- ceived. The Code-A-Phone indicator is described as "an elapsed time in- dicator that shows the volume of calls recorded", whatever that means (probably a tape counter).

COLUMN 11

Records Phone Conversations: While some of the units can be gimmicked- up to record both sides of a tele- phone conversation, the Chart only indicates those where the manufac- turer's literature show this as a fea- ture. In some units, a beep-tone every 15 seconds or so alerts the caller that he's being recorded, to conform to FCC regulations. This recording fea- ture can be mighty handy for tech- nical and legal discussions that get confused and involved. In most cases the monitor also allows group listen- ing in this mode of operation, which lends itself to great training for tele- phone solicitors — everyone listens, and then the tape is played back for discussion in a training class.

COLUMN 12

Remote Call-Back: Found only on the more expensive machines, this feature allows you to call into your TAD from any telephone in the world and hear any messages. You may also, with some units, change your outgoing message remotely. This is a luxury feature, but might be necessary for *YOU.*

COLUMN 13

Dimensions: "Wide" is across the front of the unit, "Deep" is the dis- tance from front to back, and "High" is top to bottom. If desk space is an important factor, a nar- row, deep unit may be best.

COLUMN 14

Features and Remarks: There are many features common to all the units shown, except as noted. They all record incoming messages, moni- tor through a speaker or earphone, have a silencing switch to "kill" the monitor when you want real silence, operate on regular 117 volts AC, plug directly into the phone jack (more on that further on), have vari- able incoming message length, and have fast-forward and fast-rewind controls. The footnotes cover other features, and are mostly self-explana- tory. Note F refers to a special fea- ture of the Phone Butler which allows it to be used as an "elec- tronic bulletin board" for anyone in the family to leave a message for an- other family member on the tape.

OTHER QUESTIONS ?

That pretty well takes care of ex- plaining the Chart. But here are the answers to some other typical ques- tions that might be in your mind:

What about service and guarantees? Well, since there are many units now being offered by mail, you can al- ways send those back for service. Keep the shipping cartons. Units purchased locally usually have a ser- vice center. It's a good idea to deal with an established firm; if in doubt check with Better Business Bureau

(continued on page 12)

When the Phone Company Turns a deaf ear

By Ken McEldowney

ific Telephone has lots of "customer reps" and pours tons money into "public information" media ads, but they don't you much about such little mysteries as how to decipher phone bill, how to find out your company credit rating, to avoid paying a $25 deposit, how to get it back and how ight back successfully.

ewith, some solutions to some PT&T mysteries.

HOW TO GET NEW PHONE SERVICE WITHOUT A $25 DEPOSIT

phone company likes to have a deposit from its new cus- ers to provide protection against non-payment of bills. for most people it's hard to come up with the $25.00. If phone company thinks you have good credit, they won't uire the deposit. But you must be able to answer "yes" it least one of the following questions:

Have you had satisfactory service with Pacific Telephone another phone company in California within the last two rs? By satisfactory they mean no disconnections for non- ment or no outstanding bills. All you need to do is rem- ber your old number.

Do you own your own home or other real estate in the city ere you live?

Have you been continuously employed for two years or re- ed on a pension?

Have you had satisfactory telephone service in another te in the last two years?

Do you have a friend with a phone company "B" credit ting who will guarantee $25 of your bill?

all fails, the service representative has the authority to ay deposit-free service with "personal knowledge of the plicants ability to pay." In other words, talk a good story.

you completely lose out and have to pay the deposit, it will carefully explained to you that it will be returned with in- rest after a year. In fact, if you pay your bills on time during the first six months, the service representative has the authority to return your money then, but usually doesn't. Demand the money back after six months. If your service rep refuses, ask to speak to his or her supervisor. Keep pushing.

TOP SECRET: WHAT DO THE NUMBERS AT THE TOP OF YOUR PHONE BILL MEAN?

In mid-June, American Telephone and Telegraph, at the prodding of the Federal Communications Commission, sent out a letter urging its member companies to indicate a "pay by" date on their bills.

PT&T still doesn't, but if you know its code you can figure out how long you have to pay before the threats start. At the top of your payment card are three sets of three-digit numbers with the crucial information you need.

HOW CAN YOU TELL YOUR TELEPHONE CREDIT RATING?

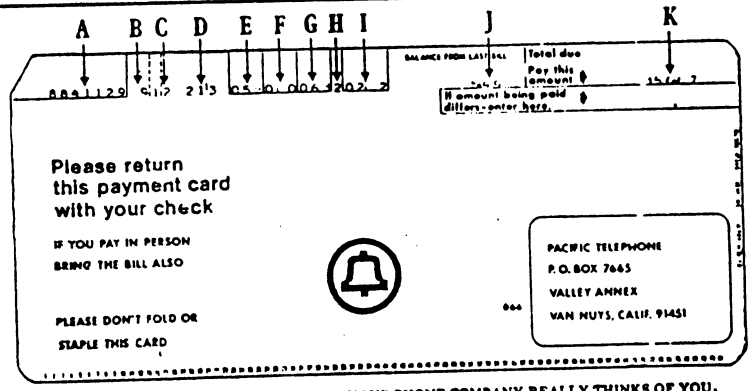
Count the days between the different notices. If Box F has all zeros and there are only ten days between the postmark date on the envelope and the date in Box E (which you have to convert to a regular date using the key), then you have a "E" rating. If all three boxes (E, F, and G) have numbers, and there are 20 days between the postmark and Box F, then you are a "C". If all three boxes have numbers and there are 60 days between the postmark and Box F, you are a "B."

HOW DID YOU GET STUCK WITH YOUR CREDIT RATING AND WHO ELSE HAS THE SAME ONE?

Your credit rating depends a lot on arbitrary decisions by your service representative. But your actual rating is crucial in determining when you get your deposit back and, even more important, whether you have two months, 20 days or ten days to pay your bill before the threats start:

Credit rating A: Very rare. Limited to big politicians, media big shots, state of California and similar deities. They never get shut off for non-payment. If worst comes to worst, a real person decides it's time to call about the bill.

(continued on page 11)



GUIDE TO YOUR PHONE BILL, OR WHAT YOUR PHONE COMPANY REALLY THINKS OF YOU.

A. Your phone number.

B. If there's no letter here, it's a residential phone; a "B" means business; "F" for final bill.

C. An internal Phone Company accounting number with no particular importance to outsiders.

D. Your area code.

E. Date the Phone Company will send out a reminder to pay your bill, if they think highly enough of you. Written in federal government style, with numbers running consecutively throughout the year. For example: Nov. 1 is 305, Dec. 1 is 335, Jan. 1 is 001. (Exception: see F.)

F. Date of the five-day shutoff notice. If all you find is 000, then the date in box E is the five-day shutoff notice date.

G. Date the computer tells your business representative to call saying that your service will be cut off.

H. If there's an "R" it's a residential phone.

I. Date of bill, month and day.

J. Balance from last bill, cleverly shaded to make it hard to read.

K. Total amount due.

DIAL TONE SPEED MEASUREMENT (part one)

By Jack Kranyak

THIS ARTICLE IS THE FIRST IN A SERIES OF ARTICLES DEALING WITH TELEPHONE COMPANY PLANT ENGINEERING AND MAINTAINANCE IT IS PRIMARILY INTENDED FOR KNOWLEDGEABLE ENTHUSIASTS AND PLANT EMPLOYEES WHO HAVE A BACKGROUND IN THIS FIELD. EACH MONTH A NEW TOPIC WILL BE INVESTIGATED AS WE PROGRESS INTO THE FIELD OF TELEPHONY.

Dial Tone Speed Measurement

PRINCIPAL USES

Dial tone speed measurements serve as an important criteria or basis for the following:

1. Quality of dial service
2. Load balancing and line assignment procedures
3. Establishing office capabilities
4. Traffic engineering of components affecting dial tone speed.
5. Detecting and controlling overloads
6. Validating data
7. Indexing

DIAL TONE SPEED AS A MEASUREMENT

The measurement of dial tone speed is recommended for all types and sizes of local dial offices including CDO's. For this purpose, a dial tone speed register circuit (SD-96403-01, for example) is recommended for all Panel, No. 1 Crossbar, No. 5 Crossbar and observed Step by Step (SXS) offices. It is also recommended for larger CDO's. In No. 1 ESS, the basic traffic measurement routines include dial tone speed.

The measure of dial tone speed (DTS), in reference to this article, is the per-cent of calls that wait for dial tone longer than three seconds (% DTS over 3"). Three seconds is used as the period of delay because studies have shown that about 50% of the customers fail to wait for dial tone when this interval is exceeded. In addition, other observations have shown that those who were satisfied had a delay as a group of 1-1.5% over 3" whereas the unsatisfied group had a delay of 3.5% over 3".

NEED FOR ACCURACY

If dial tone speed is to be effectively used in all of its applications, its measurement must be accurate, complete, and timely. In addition, because sampling is used and results are combined, the required mathematical procedures must be accurately followed.

MEASUREMENT ERROR

The accuracy with which measurements of dial tone speed show actual average service received by the customers is largely determined by the magnitude of the sources of error inherent in the following:

1. Source variation of the item measured
2. Selection of Representative Lines
3. The sampling rate (number of tests)
4. The accuracy of the 3 second timer in the DTS Register Circuit.

All of these collectively determine the confidence interval that can be expected in dial tone speed measurement.

Dial Tone Speed Register Circuit

MEASURING DIAL TONE SPEED

The DTS measuring circuit measures dial tone speed by using spare subscriber line equipment that are assigned in a prescribed manner as test lines to terminals of the DTS Register Circuit. The test lines, one at a time and in sequence, are made to appear to the dial tone equipment as a normal request for dial tone and normal response to this is made by the central office equipment. The DTS Register Circuit is arranged to recognize the return of "dial tone", and by a timing circuit to determine whether or not dial tone is returned within three seconds.

At the end of each test, the DTS Register Circuit restores the test line to the "On-Hook" condition and steps to the next test line which is tested in the same manner. This sequence continues until all lines to be tested have been used. The sequence is then repeated throughout the study period.

Each time a test is made a "T" register is scored: each time a test fails to receive dial tone within three seconds, a second, associated "D" register also scores. The % DTS over 3" is computed for the study period (usually one hour) as follows:

$$\%\ \text{DTS over } 3'' = \frac{\text{D Registrations} \times 100}{\text{T Registrations}}$$

EFFECTS OF DTS REGISTER CIRCUIT ON OFFICE LOAD

As each dial tone speed test call is terminated automatically immediately after dial tone is received or, if dial tone is not returned, shortly after 3 seconds, no significant load is placed on the dial tone servers. This allows the DTS measurements to be made at all times without affecting customer service. However, it is suggested that allowance for the calls be made when engineering No. 5 Crossbar Dial Markers.

Improvements were made of the DTS. One such modification employed the use of a synchronous timer arrangement for accurately establishing the three second delay period and for producing a fixed number of tests in a given study period (about 900 per hour). Other arrangements have been made to time the three second interval such as a cold cathode tube, without sucess, and have been modified to accept the rectangular type housing for the synchronous timer.

Test line terminations: T & D Registers

TERMINATING AND ACCESSING TEST LINES

All versions of the circuit use 206-type selectors on which to terminate the test lines and to access them. A selector has 5 arcs of 20 terminals each, thus providing for 100 terminations. One selector is provided when 100 line capacity is suitable: a second optional selector provides for the maximum capacity of 10 arcs with 200 terminations. The initial 206-selector switch is identified as the "A" switch and arcs as A2 to A6; the second as the "B" switch with arcs B2-B6. A third 206-type selector, designated as C switch, is used for control purposes.

Within the arcs, the terminals are numbered 1-20: therefore, terminals are identified by switch, arc, and terminal, I.E., A2, Terminal 3; B4, Terminal 5; ETC...

Less than or all of the 100 or 200 terminals may be used as required. However, it is not recommended that more than

(CONTINUED ON PAGE 10)

- Tel,

ave just received and read your sample copy, Volume 1 and Number 2, and oyed it enough to want to subscribe. Enclosed, find my check for $6.00. nkly, it amazes me that you have the guts to publish and the luck or tever to put out two issues. I hope you can survive for a whole year, in business sense of the word.

interest in your publication is based in my own background in telephone es, which goes back to 1964-65. At that time, I became interested in ephone billing, and finagled and unofficial visit to a central office. m scant information I picked up there, basically about the use of 2600 Hz ervisory tone, and by listening to my own phone, I constructed a "Blue Box"

ch was fun-but not for long; Telco Security had my number, so to speak, in ut 4 months. I got off rather easily because at the time, ten years ago, re were no specific laws regarding simulating the signalling. (Laws were sed right after, and because of, this incident.)

unhappy ending of my career as phone freak - the term wasn't invented yet - ngs me to a note of caution that I would like to extend to present day freaks. is this:

you want to Blue Box it, don't ever access long lines by calling information 800 or 900 area codes. This is the surest way to be caught, especially if you sistently call from the same phone.

ould suggest trying call diverters or other local numbers that will not be scernable on your phone's billing records. The trouble with information calls 800 - or 900- calls is they appear on your billing record - but not the bill receive - and hours of calls to this type of number raises suspicions. In addition, information calls never drop supervision legitimately but if you use any information call to access long lines, then make another call you will drop supervision, and that is most suspicious.

Now here, for the general welfare, are a few suggestions and numbers. First the numbers in the 412 (Western Pennsylvania) Area.

XXX-0000	1000 Hz test tone in very old exchanges. In ESS exchanges such as 391, test starts with several bursts of Rev. Batt. then goes to busy.
XXX-0062	Gives overflow signal in most exchanges.
XXX-0068	1000 Hz Test Tone in Most Exchanges.
XXX-0085	Rev. Batt. Test in Most exchanges.
XXX-0092 0093	Loop Arounds
XXX-0096	Permanent Busy
391-8999	An unusual item. I don't know what this is and would appreciate your suggestions. This number is non-supervising.
985-WXYZ-6	Rings back when you hang up. To use this number, suppose you are calling from 396-9101. Dial 985-9101, wait for dial tone, then dial 6 and hang up. NOTE: The 985 number is different in other area codes. In 312, it is 571. Also, some older equipment gives dial tone after dialing only 985 (not 985-WXYZ). When using this number, if you dial some other four digits than WXYZ you get a busy. Also a comment: since this number gives back a dial tone, it seems to have great potential, but I have never found other uses for it.

Suggestion 1. A fascinating project for the beginner in telephone experimenting is to make a list of unlisted exchanges. Use your directory to eliminate the admitted exchanges in your area, then dial the others, followed by a four digit dummy number like -1212. Depending on the equipment in your exchange, you will note a pattern to the responses. For example some exchanges you dial may give a busy signal, while others give a recording. Pay special attention to those that vary from the norm. One exchange you may find this way is 954, which at least here in the east is the information exchange for the old DTWX network, now sold to telex.

Suggestion 2. Do the same experiment with area codes. You will probably find 1 or 2 "Unlisted" codes in your area, including 903 (Mexico).

Suggestion 3. Collect central office (Exchange) codes from around the country, and look for missing codes. There should be interesting stuff here although my discoveries have been meager. I have long suspected that there is a nationwide means to dial toll-free, set up by using unlisted exchanges, but I have never found it.

And, finally, a personal note. I would like to obtain Vol 1, #1 of your magazine. Please advise if this is available.

Yours truly,

Paul Carlson
102 Allison Road
Pittsburgh, Pa.

Coming Next Month

HOW THE TELEPHONE WORKS

OVERSEAS DIALING TECHNIQUES

PAY PHONE SPECIAL

C. O. OPERATIONS

IRS SYSTEM

LABORATORY SYNTHESIS OF DMT & DET

Gentlemen,

I recently came across the following information. To make a free call from any place in the world to any place in the world, all one needs is a TOUCH-TONE line and a 2600 Hz audio signal. Simply dial any "800" WATS number. Then, after you have finished dialing and before the call goes through, inject the tone-it need not even be hooked into the line, just play it into the mouthpiece. This will clear the line. Then, just dial the number you wish to call. This method is particularly good since it is undetectable and niether you nor the holder of the WATS line gets billed.

I find your magazine quite good but would appreciate more construction plans and possibly a classified ads department where readers could exchange ideas and equipment. Keep up the good work.

S. H.
Mamaronock, NY

Letters

From the reader

Dear S.H.,

Sorry to say, but what you have described will not work on your telephone toll-free. What is required to transfer calls through the nationwide telephone network is the multifrequency (two-tones) or M-F tones. These tones consist of frequencies matrixed in pairs (combinations), two at a time, consisting of an area code and a 7-digit number preceeded by a KP (Key Pulse) and followed by a STIStart). These frequencies consist of the following: 700 Hz, 900 Hz, 1100 Hz, 1300 Hz, 1500 Hz, and 1700 Hz. TOUCH TONE frequencies are not the same as these and are: 697 Hz, 770 Hz, 852 Hz, 941 Hz, 1209 Hz, 1336 Hz, and 1477 Hz. The 2600 Hz will clear the long-distance line but unless you have the proper M-F tones, the trunk will not respond and no call will go through. You have the right idea but the wrong tones.

Telephone Electronics Line

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ear Sirs:

any thanks for the December issue of TEL, kind of reminds me of a TAP ade respectable - whatever, more power to you! It seems I was missed for e November issue, Vol. 1 No. 1, and I do wish to have a "complete" colection.

hings are taking shape up here, two or three busts by Telco plus FBI and ome interesting news is developing out of some of it. It seems that now with e so-called "disclosure" laws permitting the defendant to view before trial l the evidence to be presented against him, Ma Bell may be caught with her rawers down - an important decision may soon be reached with regards to inasion of privacy by Telco employees. Others come forward with a volume of dditional evidence to support the claim of illegal invasion of privacy. Contrary o the many press articles appearing across the country in recent weeks, the hone companies do not have a legal right to use their powerful position as a urveillance tool without court order. Local radio and television news services re taking an interest in this, too - the next few weeks should prove interesting o that portion of the public still too naive to think that Ma Bell is as benevolent nd Simon-pure as she pretends to be!

f you are interested, can furnish you with a blow-by-blow account of his arrest nd trial, including the Telco's "secret" techniques for detection, the Ikenian recorder, etc. Nothing you really didn't know, but some interesting points emerged.....

Loops (supv.) within the 206 NPA in current operation:

527-2897, 6 — 932-0018, 9
941-0018, 9

There are many more, but these work most of the time. Keep checking the Sears conference number (344-44XX), it may open again one day, with a little help. The BC conference (604-059-2111) may still be af'd into with difficulty, but simple access from 206 NPA is thru Montreal (use 514-956-4D) to get 4-A.

Both previous numbers are non-supv.

The venerable "Voice of Chester" is alive and well on 206-641-2382 (supv). Call number, wait for a re-ring signal, then hit a TT 1-1-1 in rapid sequence. A recorded announcement will then describe the week's programs. Topics like Acupuncture, health foods, CIA, sexual customs, it's all there for the listening. Numbers given by the announcement are intended to be substituted for the 1-1-1 in the first example.

Equipment wise, there are many new CMOS designs in use in this area. They draw negligible power, combine completely automatic red and blue functions and are automatically sequenced with memory storage of several numbers. All this within a case about cigarette pack size seems incredible, but I assure you they work perfectly, and circuits are available. Incidentally, a recent article appearing in one of the leading electronics trade magazines states that soon many Telco exchanges may employ message format "discriminators" to eliminate illegal MF inputs, presumably hand keyed. The computer age is here, gentlemen -- let's make it work for us!

How about an article dealing with the infamous [illegible] are getting the "most" out of their TT phone, becoming "[illegible]", setting up conferences, loops and other fun things with the use of [illegible] TT pads. Would you like an illustrated 'how-to' article?

Let me know if you are in need of Autovon accessing info.

'Green Book' currently available thru the U. N. Bookstore in N. Y. Price is quite high, even for the single volume on switching, but maybe someone with a Xerox could make this valuable info more available to those who need it. Most here have a copy of the White Book Vol. 6, and it certainly comes in handy.

Would much enjoy talking with you people sometime, what's a good number, and a good time to call? Our hats off to you all, your newsletter has a nice, alarmingly professional appearance, and we do realize the substantial effort and risks involved in its publication.

May 1975 see you prosper in a very big way.

Yours truly,

Milo Fonbi
Seattle, Wa.

Tone Speed Measurement
(CONTINUED FROM PAGE 7)

entity be assigned to one DTS Register Circuit. This is ssure optimum accuracy in measurement by reducing ipling errors through utilizing all tests for only one entity. o, it is of particular importance where the two entities not have equipments that are fully and mutually compat- with the DTS Register Circuit.

LOADING DIVISIONS: PAIRS OF T AND D REGISTERS

angements permit a seperate pair of T and D registers e assiciated with each arc, for a maximum of 20 test s. Or, more test lines can be assigned to a single pair and D Registers by grouping, up to the entire 5 arcs on h selector switch (100 lines). This is done so that DTS be measured seperately: for classes of service; for se- al loading divisions; for Dial Pulse and TOUCH-TONE, . This allows 5 pairs of registers (5 Loading Divisions) the 200-line unit.

s are associated with a particular pair of T and D Re- ers by the setting of the rotary switches in the older ver- ns and by flexible cross-connections in later versions. ognize that there can be only one Loading Division on arc. Therefore, when there over 5 Loading Divisions, 200-line unit must be used even though less than 100 lines to be tested.

importance is that DTS may be measured separately for h class of service, or Loading Division: etc, It will be ed that the Traffic Service Observing Practice (TSOP) ines Loading Divisions and also specifies how the arcs test lines are to be assigned from this viewpoint. Also, the results computed and weighted are stipulated.

BYPASSING ARCS

y or all arcs may be completely bypassed during a study riod. This avoids the loss of tests where entire arcs do have test lines terminated. Also, it allows testing to be ncentrated on selected Loading Divisions when necessary desireable.

e skipping of an arc is affected in the older versions by tting its associated rotary switch in position 6. In the er versions, by placing the associated toggle switch in down position. Thus, there are 5 rotary switches or 5 gle switches for 100-line units and 10 switches for 200- e units.

ACCURACY VS. TESTS PER HOUR

hen done as the TSOP specifies, the weighted DTS of the tity is considered reliable, being based on between 850 d 1200 tests an hour depending which versions of the cir- it is used and how the lines are assigned. It is important at all of the suggestions relating to obtaining the maximum mber of tests possible, be followed as the number of tests s a direct bearing on the accuracy of the measurement as lustrated below.

hen less than 850 tests are made in one hour, the reason ill want to be determined. Where the tube-type timing circuit used, this may denote the need for recalibration: for the ynchronous timer, this may indicate a malfunction of timer. may also mean improper use of skip, dwell and/or bypas- ng of arcs. In any event, it means an increased Sampling rror.

ome indication of the loss of accuracy when less than 850 tests are made in an hour is shown by the following table of Theoretical Limits of Sampling Error, for a 90% Assurance Level:

Actual % Over 3"	Probable Range of % Over 3" — Number of Tests (1Hour): 200	400	600	800	900
	Approximate Only				
1.0	2.0 .3	1.8 .4	1.6 .5	1.6 .5	1.5 .5
1.5	2.8 .5	2.4 .7	2.3 .8	2.2 .9	2.1 .9
8.0	11.2 5.1	10.3 5.9	9.9 6.2	9.6 6.5	9.5 6.5
20.0	24.8 15.6	23.4 16.8	22.8 17.4	22.4 17.7	22.2 17.9

Consideration will want to be given to the loss of accuracy particularly when as few as 200-400 tests are made in an hour. This is of concern when the DTS results for a small Loading Division is being reviewed. For example, in a No. 1 Cross-bar Office with three Loading Divisions as below, the measured values for Party and Coin are extremely unreliable indicators of their grade of service. However, recognize that the Weighted Entity value would be satisfactory since the entire 900 tests would be reflected.

Class Of Service		Registration		% Over 3"	
Type	TIME Busy Hour	T	D	As Measured	Probable Range (Approx.)
Ind.	10:00-11:00 AM	700	5	.7	.4 to 1.0
Party	7:00- 8:00 PM	150	3	2.0	.9 to 4.0
Coin	1:30- 2:30 PM	50	2	4.0	2.0 to 9.0
		900			

INCREASING ACCURACY FOR SMALL LOADING DIVISIONS

Where more accurate measurements for small loading divisions are required, this can be done by "skipping" the arcs for any loading divisions for which DTS measurements are not needed at the same time. In the above illustration, it will be noted that during the Coin B.H. of 1:30-2:30 PM, the coin class would be given the entire 900 tests. And, the results would be more accurate as below (assumes 4.0% over 3" measured in both cases):

% Over 3" Probable Range (Approx.)		
As Measured	50 Tests	900 Tests
4.0	2.0 to 9.0	3.0 to 5.0

The improvement in accuracy is worthwile. However, this procedure of skipping arcs is not recommended normally. This is because of the possibility of errors of setting the switches each study period causing a loss of data or the incorrect assignment of D and T Registers in the version with rotary selector switches.

The above procedure (while it does improve accuracy by reducing error due to sampling rate) in no way reduces the effects of the other three sources of measurement error listed previously. *

When the Phone Company turns a deaf ear
(continued from page 6)

Credit rating B: Preferred customer with established credit gained by six months of service without any five-day shut-off notices. If a deposit is involved, the service rep may not upgrade an account to "B." Full two months to pay your bill. Friendly reminder (gentle aquamarine notice: "Have you forgotten your payment?") followed by five-day warning (fiery red ultimatum: "Your payment hasn't arrived!").

Credit rating C: Higher classification for new customers. Purely arbutrary whether a person is put in "C or D". Odds are good that if you live in a not-so-desirable neighborhood you will automatically get a "D rating". "C" customers get 20 days to pay and a friendly reminder before the five-day warning goes out.

Credit rating D: All other new customers. They get only the five-day warning, and this comes just 16 days after the bill was originally mailed out by the phone company.

Credit rating E: Reserved for those who have had their service disconnected for nonpayment of phone bills. Five-day shut off notice comes a scant ten days after the bill was first mailed out.

WHAT DO YOU DO WHEN YOU GET THE FIVE-DAY SHUTOFF NOTICE?

If you receive a five-day shut off notice, call your service rep. Have a good story ready (you've been out of town, sick, etc.) and either make arrangements to pay the bill now or give a definite date when the bill will be paid. Set the date even if you can't stick to it. Giving a date shows you intend to pay and will keep your phone from being disconnected.

If you don't call, your service rep will try to reach you by phone on the sixth day after the date of the five-day notice. If there is no answer after two calls, the rep will shut off outgoing calls but still permit incoming calls. Again, call and try to make arrangements to pay. Your rep has to disconnect all service after five days of a partial disconnect, but superiors can authorize up to 15 days. Even if you drop a check in the mail immediately, call to protect yourself in case the mail delivery is slow.

If your service is totally shut off, your rep can require you to pay the total outstanding bill, a $24 connect charge, plus a deposit equal to twice your average monthly bill over the previous three months. Again, this can be waived if you scream loud enough.

One final warning: everything gets noted on your record. If your phone is disconnected, your credit rating is going to drop to a "D" or an "E". If you give excuses every month, the rep will catch on. It's best to pay on time when you can and save your late payments for real emergencies.

HOLIDAYS FOR THE PHONE COMPANY ARE HIGHLY SELECTIVE.

The phone company has special long distance rates for holidays that are much lower than weekdays. In the coming year, July 4, Labor Day, Thanksgiving, Christmas, New Year's and Washington's Birthday are all special-rate holidays. But not Columbus Day or Memorial Day, which are both holidays for phone company employees, Mother's Day or Father's Day, when people would be prone to make calls to their family.

WHAT THE BILL DOESN'T TELL YOU THAT IT SHOULD.

In mid-June, AT&T urged its member companies to include on their bills the time of day of long distance calls and the duration of the calls. Unfortunately, even though these changes are on Pacific Telephone's drafting boards, they have yet to be made. Thus, the actual lengths of your long distance calls are not noted on your bill, so there is no way you can easily check to see if you were charged for more minutes than you actually spoke. Furthermore, the time the call was made is not noted on operator-assisted calls. If there is a mysterious operator-assisted call to Lodi on your bill, you don't have the advantage of knowing when they think the phone call was made to determine who, if anyone, actually made the call.

DOLLAR WHEN YOUR SERVICE IS CONNECTED.

The phone company is able to rack up extra profit because people take phone service for granted, and even if a person wants to get the cheapest service, he or she is not provided with the information to make an intelligent decision.

For example, when you order a phone, anything you get beyond a single-listed dial phone with a short cord is going to cost you. For example: a 25-foot cord will set you back $7.50; a touch tone phone costs an additional $5 to install plus $1.60 each month; even an extra listing in the directory will cost you $4.80 a year.

If you live alone, are new to the City or don't use the phone too much, it will pay you to get a measured service.

For $2.50, you get 30 local calls. For $3.75 you get 60. Unlimited service runs $5.70. With the measured service, each local call past your allotment costs you 5¢. In other words, if you make less than 54 calls a month, it pays to get the $2.50, service; less than 100 calls, get the $3.75 plan. If you consistently make more calls than you thought you would, you can always switch to a different service at no extra charge, but it pays to try the limited calls alternatives.

WHEN SAYING HELLO TO NEW YORK CITY COSTS ONLY EIGHT CENTS MORE THAN SAYING HELLO TO WALNUT CREEK.

Over the years, the gap between the expense of a long distance call and one within the state or even within the Bay Area has narrowed to the point where it often has ceased to exist. For example, a one-minute call to New York City after 11 pm will only cost 35¢, while a three-minute (or shorter) call to Walnut Creek will cost 25¢ from downtown SF.

The following chart of phone charges for direct dialing from SF to New York City illustrates the cheapest times to make out-of-state calls:

Time	First Three Min.	Each Addl. Min.
Sat. 8 am - 11 pm Sun. 8 am - 5 pm	70¢	20¢
M-F 5 pm - 11 pm Sun. 5 pm - 11 pm Hol. 8 am - 11 pm	85¢	25¢
M-F 8 am - 5 pm	1.45	46¢
M-F 11 pm - 8 am Sat., Sun., Hol.	35¢*	20¢

* First Minute

HOW TO GET RESULTS IF YOUR SERVICE REPRESENTATIVE TURNS A DEAF EAR.

The phone company has very set procedures but often can be made to grant exceptions if you complain clearly, loudly, and persistently. Each time your demand gets turned down, ask to speak to a superior. The higher you go, the more likely the person is to say "yes" or listen sympathetically. Above the service rep is the supervisor, then comes the manager.

If necessary, ask for the district manager, then the division manager. Ask for a personal interview, write letters with carbons. If you are still stymied, ask for the president, Jerome Hull. After you talk to his secretary, your last resort is to complain to the California Public Utilities Commission. (In SF it's 557-0350). Send carbons all around.

Make threats all up the ladder: state that monopolies like Pacific Telephone have to give the customer satisfaction; mention the US government's antitrust suit; say you will oppose their latest rate hike request unless you get satisfaction. Remember: complain enough and you will often get results. *

COMPARISON CHART — TELEPHONE ANSWERING / RECORDING DEVICES

1 MANUFACTURER OR DISTRIBUTOR	2 MODEL NAME & NUMBER	3 SUGGESTED RETAIL PRICE $	4 MAXIMUM OUTGOING MESSAGE (SECONDS)	5 VARIABLE LENGTH OUTGOING MESSAGE	6 MAXIMUM INCOMING MESSAGE (SECONDS)	7 MAXIMUM MESSAGES (TOTAL)	8 VOICE ACTIVATED	9 AUTO LEVEL CONTROL	10 CALL RECEIVED INDICATOR	11 RECORDS PHONE CONV.	12 REMOTE CALL-BACK	13 DIMENSIONS (INCHES) WIDE	DEEP	HIGH	14 FEATURES & REMARKS
CCURATE MERCHAND. INC. 0 Madison Ave. ew York, N.Y. 10017	TELE-TENDER MODEL K229	140	60	YES	45	90	NO	YES	NO	YES	NO	13	9	3	A B C D
ELAIR ENTERPRISES 923 Cerise Ave. awthorne, Calif. 90250	MY SECRETARY MS-1	159	20	NO	25	108	NO	YES	LIGHT	NO	NO	12½	10¼	4½	A E
SR (USA) LTD. onsumer Prod. Route 303 auvell, N.Y. 10913	PHONE BUTLER TA-1000	100	20	NO	30	30	NO	YES	LIGHT	NO	NO	9	10	2¾	E F Q
RAFT ELECTRONICS, INC. 30 Hempstead Turnpike ranklin Square, N.Y. 11010	MARK I	160	180	YES	60	EXTERNAL RECORDER	NO	EXTERNAL RECORDER	EXTERNAL RECORDER	NO	NO	9	10⅜	3⅝	External Recorder Needed to Receive Messages. Voice-Activated Unit Available at $130
	MARK II	219	180	YES	60	60	NO	NO	NO	NO	NO	14¼	10⅜	3⅝	A B Voice-Activated/Automatic Level Control Unit Available at $295
	MARK III	495	180	YES	2700	90	YES	YES	NO	NO	YES	14¼	10⅜	3⅝	A B G
ROWN (Japan) RADIO CORP. 28 E. Harris Ave. o. San Francisco, Ca. 94080	CTA-4100	100	120	YES	120	EXTERNAL RECORDER	NO	EXTERNAL RECORDER	EXTERNAL RECORDER	NO	NO	8½	10½	3⅝	External Recorder Needed to Receive Messages; Direct Connection to Phone Line is not Required.
	CTA-4400T	240	20	NO	90	90	NO	NO	TAPE COUNTER	NO	NO	10	12¾	3¼	A B C Direct Connection to Phone Line is not Required.
	CTA-4450	290	23	NO	90	90	NO	YES	TAPE COUNTER	YES	NO	15¾	11	4¼	A B C D Direct Connection to Phone Line is not Required.
DICTAPHONE CORP. 20 Old Post Road Rye, N.Y 10580	ANSAPHONE 640	325	180	YES	2700	90	YES	YES	TAPE COUNTER	NO	NO	8½	8½	5	C H
	ANSAPHONE 650	450	120	YES	1800	60	YES	YES	TAPE COUNTER	YES	NO	10½	14	4	A B C D Question & Answer Programming Mode
	ANSAPHONE 590	695	180	YES	2400	80	YES	YES	TAPE COUNTER	YES	YES	12	12½	4	D
DICTRAN INT'L. CORP. 755 Folsom St. San Francisco, Ca. 94107	DORO 311	345	720	YES	3600	120	YES	YES	CALL COUNTER	YES	NO	12½	11½	3½	A B C D I J K
	DORO 320	695	720	YES	3600	120	YES	YES	CALL COUNTER	YES	YES	12½	11½	3½	A B I Appears to be Identical to Sanyo Answer Man
FORD INDUSTRIES, INC. 5001 S.E. Johnson Creek Bl. Portland, Ore. 97206	CODE-A-PHONE MODEL 360	200	120	YES	120	90	NO	YES	NO	NO	NO	10	12¾	3¼	G Three Switch-Selected Outgoing Announcements
	CODE-A-PHONE MODEL 525	425	18	NO	900	30	YES	YES	YES	NO	NO	14	11	5	G L
	CODE-A-PHONE MODEL 444	650	18	NO	1200	45	YES	YES	NO	NO	YES	14⅜	9	4½	G J K Three Switch-Selected Outgoing Announcements
	CODE-A-PHONE MODEL 560	795	18	NO	1800	60	YES	YES	YES	NO	YES	14	12	5	B
	CODE-A-PHONE MODEL 700	895	180	YES	7200	120	YES	YES	YES	NO	NO	11½	14	4¾	B VOX Control (Tape Pauses when Speaker Pauses)
	CODE-A-PHONE MODEL 800	995	180	YES	7200	120	YES	YES	YES	NO	NO	13	14	5	E M N Q
PHONE-MATE, INC. 335 Maple Ave. Torrance, Ca. 90503	PHONE-MATE 400	140	30	NO	30	20	NO	N/S	FLAG	NO	NO	9½	12	3½	C E N P Two Switch-Selected Outgoing Announcements
	PHONE-MATE 800	170	30	NO	30	20	NO	N/S	FLAG	NO	NO	9½	12	3½	E N Remote Call-Back for use with Phone-Mates 400 & 800
	REMOTE-MATE	130	30	NO	30	8 PER CALL-BACK	NO	N/S	FLAG	NO	YES	9½	12	2⅜	A B I Appears to be Identical to Code-A-Phone Model 360
ROBINSON/OHMURA 1366 Ninth Ave. San Francisco, Ca. 94122	SANYO ANSWER MAN	259	120	YES	120	90	NO	YES	NO	NO	NO	10	12¾	3¼	A B C E R
STENO-PHONE CORP. 1561 Hempstead Turnpike Elmont, N.Y. 11003	XL-700	99	N/S	NO	N/S	60	NO	YES	NO	YES	NO	13	10½	3¾	

NOTES: EXCEPT AS NOTED, All Units: Record Incoming Messages; Monitor Through Speaker or Earphone; Monitor Can be Silenced; Operate on 117 Volts AC; Plug Directly into Phone Jack; Can Vary Incoming Message Length; Have Fast Forward and Fast Rewind.

N/A — Not Applicable.
N/S — Information Not Supplied.
A Records & Plays on Standard Cassettes.
B Can Be Used for Dictation.
C Earphone used for Private Listening.
D Allows Group Listening to Calls.
E Incoming Message Length Fixed.
F Family Message Center Included.
G Fast Forward N/S.
H Plays Standard Cassettes.
I End of Tape Disconnect.
J Outgoing Message can be Changed by Remote Call-Back Unit.
K Accumulated Messages Can be Erased by Remote Call-Back Unit.
L Fast Rewind N/S.
M No Fast Forward.
N Battery-Powered.
P External Recorder for Additional Messages.
Q Monitor Always On.
R Monitor N/S

Chamber of Commerce. Guarantees vary from 90 days to a year; some units are sold with a service policy for additional cost. Be sure what's included.

Are these things legal? Sticky question, so let me quote from the Phone Butler Manual: "The use of accessory telephone equipment is perfectly legal. However, the telephone company has the right to require you to use one of their telephone couplers - this usually involves an installation fee of about $20 and a monthly $4 -$5 rental. This may be required to protect their equipment, employees and to provide uniform service. You are under no obligation to inform the phone company that you have installed a telephone answerer, and you are under no obligation to rent a coupler from them unless they tell you there is trouble on your line resulting from it..... All the units described in this survey are wired directly into the phone lines, except the Crown units, which *CAN* be acoustically coupled. If you ask the phone company, you'll be told you must have a coupler. If you don't ask, and just do what everyone else is doing - wire in - you'll probably never be challanged.

What if you don't have a jack to plug into? Again, let's quote the BSR manual: "If your telephone is wired directly to a small box on the wall, and does not use a plug and jack, you may want to have the telephone company install a jack for you. To avoid the expense of the coupler, you should tell the phone company that you want one of your existing phones made "portable", with a plug and two or more jacks installed. Remember, the answering machine is perfectly legal". You can also install your own jacks with parts from electronic supply stores.

How about multiple-line or business phones? Most of the companies have simple adapters, at extra cost. If in doubt or confused, have your unit installed by the seller, probably at extra cost.

What about leasing Phone Company units? Check with your local phone company for units available, installation charges, and monthly charge. They have very reliable devices, and there is never a service charge—but you pay through the nose! When you buy a unit, you own it.

Can you buy a TAD on credit? The more expensive units can be leased or bought on monthly payments. Most dealers also sell on Mastercharge or Bankamericard.

Which unit is the best? That's a loaded question. You can't go by price alone, since you must consider which features are necessary for your use. The average user would probably find the Phone Butler, at $100, a *BEST BUY*. If more elaborate features are required, the Sanyo Answer Man (or Code-A-Phone Model 360, which is identical, with a 90 day guarantee, as oppossed to the 1 year Sanyo guarantee) is a very versatile unit. The Doro 320 will do just about anything you might want - but now you're up to a $695 unit. The best procedure is to first decide which features you *MUST* have, look over the Chart for units with these features, and send for brochures or call a local dealer. Check the Yellow Pages in your local phone book, under "Answering Machines - Automatic" you're willing to find some dealers in your area. Get the unit you like best for the money you're willing to pay. Actually, only after owning or using a unit for awhile will you *REALLY* know what you want and need!

*

now available for the telephone experimenter

COMPLETE CONSTRUCTION PLANS

TELEPHONE PLANS: $3.00 each.

Answering Device
Automatically answers the ringing line, plays a pre-recorded announcement, takes the calling party's message, and hangs up.

"Black Box"
Device that the FBI uses to wiretap and monitor telephone conversations silently, from a remote location from the phone.

Call Limiter
Stop those long-distance calls made by your friends! Device disconnects all long-distance calls from your telephone line.

Central Dial Exchange
Now you can call the other end of your house on your private telephone system. Great for the office without a PBX system.

Recorder-Actuator
Now you have the capability of recording telephone conversations automatically every time the phone is in use.

Schematics
The basic schematics and parts lists for commonly used telephones. Includes a description of the telephone network.

Telelink Burgler Alarm
Use the telephone line as a link to notify you when intrusion occurs. Great for babysitting purposes and remote applications.

Automatic Dialer
Automatically dials a stored number in its magnetic memory. Takes Touch-Tone or Dial and stores hundreds of numbers.

Call Diverter
Answers the ringing line automatically and dials a pre-recorded number to divert the original call to a remote location.

Conference Bridge
Automatically puts your friends on a group conference as they call in. Have three or four way calls from your home phone.

Melodic Ringing Generator
Add harmony to your phone. This device eliminates conventional ringing and produces a melody with each ring cycle.

Remote Control
Before you leave work, call your home and utilize this device to turn on the stove and heat your dinner. Avoids burglars too!

Speakerphone
Enjoy hands-free conversation on the Speakerphone. Similar to Bell System type, but uses two-way transmission instead.

Voice Scrambler
Talk and listen to your friends in the normal manner, but good luck if someone else tries to monitor the conversation.

ELECTRONIC PLANS: $5.00 each.

Biofeedback Conditioner
Moniter the fluctuations that your brain produces and learn to put yourself in any mood desired. Completely harmless.

Multifrequency Encoder Network
Control over telephone line from this pocket-size unit. Learn to manipulate your telephone and speed calling rates by 500%!

Horticulture Stimulator
Stimulate plant growth as much as 300%. Can be used on a particular section of the plant or on the entire plant [illegible]

MISC. PLANS:

Dodecahedron Speaker Enclosure $7.50.
Unique twelve-sided enclosure enhances response from any speaker. Unusual design adds to any home decor.. A must for the audiophile and design engineer.

Photographic Pinhole Camera $3.00.
Small, compact, easy to build camera costs only the price of the film cartridge. Plan includes proper exposure setting tables and film types that produce best results.

THE LEGAL ASPECTS OF INTERCONNECTION

The complete reference book on the legal rights of the telephone customer. $29.95, postpaid.

WE ARE VERY HAPPY TO ANNOUNCE THAT THIS BOOK IS NOW ENTERING THE FINAL STAGES OF PRODUCTION AND IS ALSO BEING MADE AVAILABLE FOR SALE. WE HAVE RECENTLY ACQUIRED COPIES OF THE TARIFF REGULATIONS DEALING WITH INTERCONNECTION, AND SOME VERY INTERESTING INFORMATION DEALING WITH THE NEW COURT RULINGS ON INTERCONNECTION ILLEGALITIES. WE WILL ALSO BE INCLUDING SOME OF THE INFORMATION GATHERED BY OUR STAFF OF *TEL* ENGINEERS AT THE VARIOUS LEGAL LIBRARIES IN SOUTHERN CALIFORNIA. WE WANT YOU TO KNOW WHERE YOU ARE RIGHT AND *THEY* ARE WRONG AND EXACTLY WHAT YOU CAN DO SHOULD A COMPANY [illegible] WE WILL GIVE YOU EXPERT, RELIABLE ADVICE [illegible] NICAL EXPERTS HAVE BEEN BUSY GATHERING [illegible] WE WANT YOU TO KNOW WHAT TO DO AND [illegible] MATERIAL IS UNIQUE IN CONTENT AND [illegible] ENJOY READING IT AS MUCH AS WE ENJOY [illegible]

ALL OF THE CONSTRUCTION PLANS ABOVE ARE AVAILABLE FOR $24.95, WITH "LEGAL ASPECTS" BOOK, $19.95 AIRMAILED

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TEL SYSTEM
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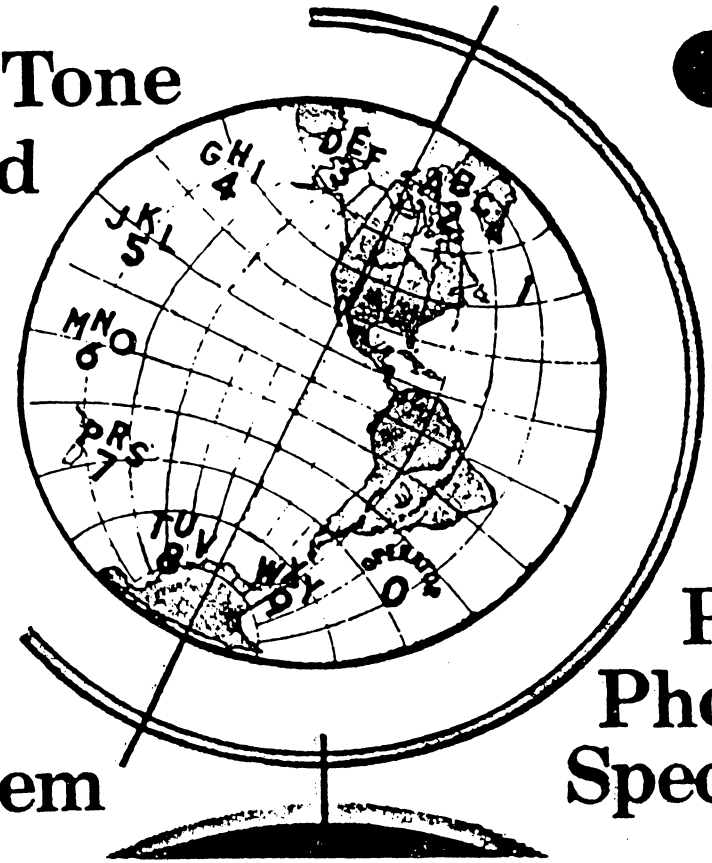
TELETRONICS COMPANY OF AMERICA

NEW FORMAT, NEW STYLE — THIS ISSUE!

Telephone Electronics Line
TEL
VOL 2, NO 3 • MARCH 1978 • FIFTY CENTS

How The Telephone Works

Dial Tone Speed



IRS System

Pay Phone Specia

OVERSEAS DIALING TECHNIQUES

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TEL SYSTEM

TEL CONTINUES TO GROW: With almost 7,500 subscribers we are now a "force" to be reckoned with. If you are not yet a member of the TEL family now is the time to join us.

As a note of special thanks, TEL now offers free subscriptions to those unfortunate ones among us who, due to a bit of bad luck, are now behind bars for "exploring the greater depths of their telephone".

If it's TEL, it's swell!

To Telephone Electronics Line, 22035 Burbank Blvd., Woodland Hills CA 91364

Please send me: a one year FIRST CLASS subscription to TEL @ $12.00 ☐

a one year REGULAR subscription to TEL @ $ 6.00 ☐

Name_____

Address_____
house number street

_____
city state zip code

Enclosed is my check for: $12.00 ☐ $ 6.00 ☐

Editorial

By Jack Kranyak

As TEL enters it's fourth month of publication we can only be absolutly amazed at the reception you have given us. When we first started publication in November of last year we thought TEL would appeal to a small group of people to whom the telephone and the telephone company held a special fascination. Well, frankly we were wrong!

The question of course is, how does this affect you? Well for one thing the unexpected response, almost 10,000 subscribers to date, caught us unprepared to handle the basic task of getting that many magazines labled with your names, sorted by Zip-Code and into the mail. That alone was an obstacle, but not the only one. The very task of printing the magazine required a whole new aproach.

At this point we were forced to take a good look at ourselves, and what we wanted to provide to you through TEL. Our old equipment, mostly one Selectric typewriter and an outdated label maker were simply not up to the task.

It was (and still is) our goal to bring you something which is just not available anywhere else on the "open market". And we hope we have been meeting that goal. Each issue we try to give a good mix between highly technical discussions (see C.O. Operations this issue) and articles of more basic interest. These include pieces on the operation of the basic telephone instrument and interesting information on access numbers and codes.

But, more than just provide you with information we wanted to do it proffesionally. We are not the first in this field but we are the only ones. Others have tried to "ditto" or mimeograph but these efforts inevetiably fell apart.

In order to provide you with the kind of publication we think you wanted when you first subscribed, we made the decision to "do it right". Starting in January we began a program of replacing our equipment and doing work ourselves that previously had to be sent out.

To date we have spent more than ten thousand dollars to improve our magazine. This has not yet been visable to you, in fact for the last two months our service has been paradoxically worse. For this we extend our apologies, we just grew faster than we could handle at the time. Now we are ready!

The only sad note is that we have been forced to raise our subscription rates. This change took place starting with the January issue. However those who are already subscribers will not be charged for the difference.

We thank you for your help in keeping TEL afloat.

BACK ISSUES

We are pleased to announce that back issues of TEL are now available. Due to the large number of requests for back issues we have started a new press run to meet the demand.

The issues available are: Nov. 74, TSPS; Dec. 74, Toll Free Dialing; Jan. 75, Area Code 900, Detection and Hold Button; and Feb. 75, Phone Bill and Answering Devices.

These issues are unrevised original copy sent by first class mail in a manila envelope and cost $1 each. Please specify the issues desired and enclose payment with your order.

TEL SOLICITS ARTICLES

In order to make TEL more open to it's readers we are adopting a new plan whereby TEL will pay for readers articles used in TEL. Additionally, we welcome schematics and circuits for our line of plans.

We will pay between 10 and 15 dollars for material used in TEL and up to $50 for scematics used in our plans.

Material submitted should be typed with all illustrations in ink. We can assume no responsability for any item sent and all contributions become property of TEL. ☐

Overseas Dialing Techniques

By JOHN REYNOLDS

Until recently it was impossible to dial a call to a point outside North America (with the exception of Hawaii). However, a new Phone Company service will change all that. Direct Overseas Dialing is now becoming available to home subscribers. In a program called *International Direct Distance Dialing* (IDDD) currently being introduced, you will be able to dial directly to most European points as well as Israel, S. Africa, Venezeula, Austrailia, Japan and Hong Kong. A Bell spokesperson, contacted for information about the service, told TEL that a pamphlet titled "International Direct Distance Dialing" will be available from local business offices in areas where the service exists.

The technique is quite simple, the caller dials "011" followed by the two or three digit code for the desired country plus a one to six digit code for the city and finally the desired number. If the caller has TOUCH-TONE service he may "dial" a "#" after the last digit, this will speed up the call, but is not necessary.

The IDDD system, while new to the home subscriber, is very similar to the method used by operators since the introduction of *Multi-frequency* (MF) switching. In this procedure the operator keys: KP + 011 + XXX + ST, and waits for an *international dial tone* then KP + XXX + City Code + the desired number. The XXX is derived from the country code plus a "1" or a "0" and will be explained in detail later. It is important for the call to be completed as soon as possible after receiving the *international dial tone* – at most 7 seconds – because there are a limited number of these international dialing channels (TASI).

The IDDD system simply codes the TOUCH-TONE tones into MF tones and adds KP and ST at the proper places.

That is the basic system for "normal" overseas dialing. There are, however, some refinements which can be used for better

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SWEDEN	46
SWITZERLAND	41
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THAILAND	66
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THE U.S.A., CANADA, MEXICO AND CENTRAL AMERICA ARE ALL 1

DONT FORGET! LIKE AREA CODES YOU DO NOT USE A COUNTRY CODE TO CALL INSIDE YOUR OWN AREA.

FRESNO—Way station for tax returns

By HARRY ANDERSON

MILLIONS OF DOLLARS PROCESSED EACH DAY THROUGH IRS CENTER

Fresno—This is where they bring your federal income tax return after you mail it. They sort it here, staple it, computerize it, microfilm it, store it and ship its key information—on tape—to higher headquarters to approve your refund and decide if you should be audited.

It all amounts to one of the world's greatest paper shuffles, and Fresno is just one of 10 Internal Revenue Service regional processing centers. It handles roughly 10– million individual tax returns per year from California and Hawaii.

How tax returns are processed and selected for audit used to be more of a secret than it is now. Taxpayer lawsuits, congressional criticism and the Freedom of Information Act have opened up the process to public scrutiny.

In theory, at least, the operation is a tribute to bureaucratic problem solving.

Three times a day, mail trucks loaded with bags and carts full of tax returns pull up to the mammoth, 12 acre IRS building in southeast Fresno. The center handles 110,000 individual returns on an average day this time of year.

Old hands say the mail is heaviest on Mondays, after taxpayers spend the weekend wrestling with returns. It also comes in spurts during the season—late January (after W–2 forms come out), late February (those expecting a refund), and again in the week before the April 15 deadline (those who have to pay up).

Envelopes zip through an opening machine at the rate of seven per second. The machine also sorts them according to type of return inside and the location from which they were mailed.

(How, you may wonder, does the machine know what to do? It "reads" those curious black squares on the outside of the envelope IRS supplied with the tax forms it mailed you. If you don't use the IRS envelope, the system slows down.)

From there, they go to employes who remove the returns from the envelopes, sort out the documents inside and send any money attached to the accounting department.

What happens if somebody mails cash? "The sorter stands up, raises his hands in the air and yells, 'CASH!' and waits for the supervisor," an IRS official said.

Bank of America stations a number of its employes at the Fresno IRS center to record and deposit the tax monies as they come in. Last year, B of A received average deposits of more than $33 million every day at the Fresno center during tax season.

More than 450 IRS examiners check the returns manually to make sure taxpayers signed them, that W–2s are attached and the names of dependents are listed.

It's a repetitive chore—examiners usually check about 65 individual returns per hour. If the examiner is checking the so-called "short-forms" return, he ususally gets through about 120 per hour.

Once the examiners finish their simple checks, the computer takes over. IRS decided long ago the avalanche of paper it receives had to be reduced to computer form or else the agency would slip into bureaucratic chaos.

So, at Fresno, more than 400 employes enter information from your tax returns into the computer system. Not everything you write on the returns gets into the computer.

Basically, what's entered is on the first page of the return—adjusted gross income, taxes paid, exemptions and refunds due. Information about total deductions, if you itemized them, and about the dividends and other income you reported on separate schedules also is entered.

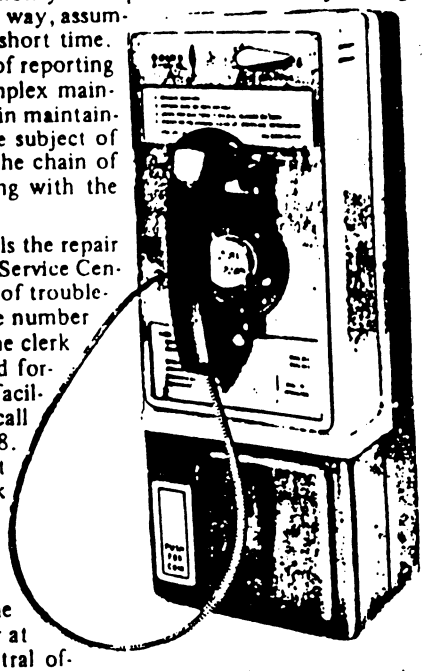
The computer does the addition, subtraction and tax calculation, then checks it

(Continued on Page 13)

Pay Phone Special

By ROBERT KLEIN

In the course of the average day, many people will encounter a pay phone that is out of order (OD) for one reason or another. These people will usually place an out-of-order sign on the telephone, and go to another location to notify the repair service. His duty having been completed, the subscriber goes on his merry way, assuming that the problem will be taken care of in a short time. But what is not known is that the simple action of reporting an OD on a pay phone (PT) initiates a very complex maintainance and service routine performed by the coin maintainance craftsman. These complex routines are the subject of this article. We will now give a description of the chain of events incurred by the trouble report, beginning with the customer dialing repair service.



When the customer wishing to report an OD calls the repair service, it rings into what is known as the Plant Service Center (PSC). This office is usually manned by a staff of trouble-reporting clerks. The customer gives the clerk the number of the OD PT and the nature of the problem. The clerk then writes up an inter-office trouble ticket and forwards the report to the appropriate test board facility, usually located in the PSC where the repiar call was taken.. Suppose the OD number is 555-2368. The test man will then take the ticket to his test position and proceed to get up on a no-test trunk (verification) in the 555 office, after which he will dial the 2368. He will then be abruptly connected into the OD circuit. Then by using his test equipment he can determine more closely the actual nature of the problem and whether the problem is located in the central office itself or at the PT. If the problem is located in the central office, he will ring down to the frameman, who will walk over to the switching apparatus in use by the OD PT and attempt to knock the trouble out. This might mean the un-sticking of a line relay, etc. Should this occur, the frameman notifies the testman, who will file the trouble ticket with the records department, and continue on with other reports. However, should he determine that the nature of the problem is outside the office, he will make such a notaion on the trouble ticket, along with the actual nature of the problem and forward it to the dispatch section of the PSC responsible for dispatching the coin craftsman out to the trouble location. The office responsible for dispatching and co-ordinating the coin craftsman is called "Relay". The craftsmen are periodically required to call into relay to report their progress, receive additional trouble reports, announce lunch breaks and also to announce when they are heading for the "Barn" (the PSC) at the end of the day.

A fact worth mentioning is that the relay number is non-supervising (free); as most of the men would resent paying a dime just to report required information. These men also carry a small pouch in their tool belts that are filled with a pre-determined amount of coins, in different denominations, all of which are colored with a permanent ink. This is done to insure that, should the craftsman loose money in a PT he is attempting to fix, the accounting office can take these colored coins out of the regular collection. By way of a color code these coins are returned to the proper man. It is, by the way, a myth that a coin craftsman has access to the coin box. His key opens only the upper part of the machine. About all he can do is poke a thin wire

(Continued on Page 9)

THE TELEPHONE: a basic introduction

COMPILED BY TEL STAFF WRITERS

Like any electrical circuit the telephone requires four basic elements: A power source to set the electrons in motion—such as a battery or generator; An electrical apparatus—like a motor, lamp, TV set or a telephone—to be operated by the electrons; A conductor which provides a continuous "pipe" through which the electrons can flow from the power source; and a switch to complete the circuit and to turn the electron flow on and off.

The Telephone Circuit

Like a light bulb, the telephone operates as part of an electrical circuit. The power source is in the telephone company office building. The conductor is the wire and cable that lead from your telephone to the telephone building. The appparatus is the telephone itself. The switch is built into the telephone.

The switch that opens and closes the telephone circuit is operated by the two "buttons" beneath the telephone handset. With the handset resting in it's cradle, the buttons are pressed down—the circuit is broken. Lifting the handset releases the buttons and a spring releases the switch. The circuit is now complete. It brings you the dial tone to tell you that the telephone equipment is ready to handle your call.

The telephone also contains two other important units. The *bell* is operated by electric current to call someone to the telephone. The *dial*, when operated, sends a kind of "electrical code" to search out and find the other telephone you are trying to reach.

In the TOUCH-TONE phone, push buttons replace the dial. When a button is pushed music-like tones are transmitted to the central office where they operate equipment sensitive to the tones which in turn find the party you are dialing.

Electricity and Sound

Basically, the telephone is an instrument which permits you to talk with someone at a distance—almost instantly—through an electrical conductor (such as wire). Voice signals will not travel along a wire, but

(Continued on Page 11)

DIAL TONE SPEED MEASUREMENT (part two)

By JACK KRANYAK

This article is the second in a series of articles dealing with telephone company plant engineering and maintainance. It is primarily intended for knowledgeable enthusiasts and plant employees who have a background in this feild.

Each month a topic will be investigated as we progress into the field of telephony.

SELECTION OF LINE EQUIPMENT TO BE TESTED

Measurement Error

The Dial Tone Speed measurement is intended to accurately show the DTS that is average for all of the customers in the entity or loading divisions for each hour studied. As these tests are not made by a random selection of lines it is necessary to select lines in a particular manner if the objective is to be achieved. When properly done, the measurement error inherent in the selection of sample items is minimized.

Selecting The Lines

In making the selection of lines the following will want to be considered. One objective is to achieve a measure that reflects the variations in DTS that exists between Horizontal Groups, Line Groups, Vertical Groups and Line Load Control Groups. Recognize that this is to be done even within Loading Divisions where they exist.

(Continued on page 10)

Coming Next Month

ANATOMY OF A PHONE BUST

CENTRAL OFFICE OPERATIONS
Part 1: Step-by-Step Switching

TOUCH-TONE®: What it is, What it Does

CONSTRUCTION PROJECT:
add four new numbers to your touch tone phone

NOTICE

TEL welcomes letters from readers on all topics of interest, however—we regret that due to the huge volume of mail we receive we can not answer each letter individually. Letters of general interest will be printed as space allows but we simply do not have the time to reply to the myriad of requests for technical information that arrive each day.

We do, of course appreciate your comments, and try to slant our articles to your interests.

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RED BOXES BLUE BOXES & DMT

Due to unforseen legal difficulties the article on Tone Boxes originaly scheduled for the Feb. issue has been indefinitly postponed. It was felt that it would be more prudent to delete the article than risk what has befallen RAMPARTS and ESQUIRE in the past. It is, however, hoped that the article will appear sometime this summer.

In related matters, the article on DMT and DET synthesis scheduled for this issue will not appear. In an editorial decision it was felt that TEL was not the proper forum for an article of this nature. However, type has already been set so that those who are interested may order "reprints" from TEL at 50 ¢ each including postage.

Gentlemen;

I am a current subscriber to TEL and find the information very interesting. However, I do have several questions.

First. I am considering running an advertisement in your publication as a distributor of 'hard-to-get' telephone equipment for experimenters. I am currently in a position to acquire some apparatus that is not available through the usual electronic outlets. Would you consider such an advertisment and what would be the rates?

Secondly. How many subscribers do you currently have?

Third. As with the *Ramparts* magazine it was learned that A.T. & T.'s lawyers and security requested lists of all subscribers after publication of certain articles dealing with toll defrauding and other equipment. Has TEL had any requests and if it has did they comply with the Telco?

Fourth and last. Has your magizine been published on time?

C.A.
Ohio

Dear C.A.
I think you will find two of your questions answered in this issue. For the other two—First, we do not give out the names of our subscribers to anyone for any reason. Secondly, our subscribers number about 7,500 at the moment and increase by about 1,500 each month. re: our advertising—the rate card is now being published and yours will soon be in the mail.

Dear TEL,

Although it has never been universally established, there are numerous cases in which calls have had to be removed from a subscriber's bill, wherein a "conversation" never took place. Such as when a small child answers the phone and cannot carry on a conversation. Or in another instance, a workman—say a plumber, working in your house answers only to say there is nobody at home. Or perhaps a person answers who only speaks a foreign language and is unable to converse. All of these are unchargeable calls. In fact, in some cases if you get a recorder, but do not leave a message, it may be a non-chargeable call. In other words, you pay for a conversation with a real person.

R. G. T.
Moraga, CA

Dear Sirs,

I have just received my first copy of "Telephone Electronics Line". Your "statement" indicates that your publication in no way constitutes a conspiracy to intentionally defraud any common carrier nor do you support any illegal implements or actions on or drawn from your publication or it's contents.

In the January issue you describe the techniques of "blue boxing" under the article "Modern Phone Phreaking" and then the "Detection, How To Avoid It".

I am sorry but I cannot continue to subscribe to a magizine which lifts up and even encourages illegal telephone activity and then teaches how to avoid apprehension.

I am sorry that your talents and efforts are directed in such a perverse direction. Would you please be so kind as to cancel the balance of my subscription.

R.E.P.
Tuscon, AZ

TEL does not encourage illegal activity and is sorry for any misunderstanding.

Dear John:

I was very interested in your Multi-frequency Encoder Network construction plans, and would greatly appreciate a description of what it can do. In the letters section of the Feb issue S.H. told how to make a Blue Box over the WATS system, only he made the frequencies wrong. Will the above unit produce the proper tones? Being new to "phone freaking" I have a question, Is the Blue Box simply a unit which generates the proper 697Hz-1477Hz pairs? If so how do you do it? I have plans for a unit which generates Touch-Tone frequencies, can I use it? I would like to see several articles for newcomers which would cover some of the equipment, (Blue and Red Box) And more construction features.

S.T.
Nashville, Tenn.

The Multi-frequency Encoder produces the same tones as those used by an operator (see "Little Lexicon" this issue). Touch-Tones are produced by a totaly different system, a matrix of 7 tones are used to produce the 12 pairs, and will not perform so called "blue box" functions.

P.S. Milo Fonbil (or is it Phone Bill) we have mail for you!

Pay Phone *(Continued from Page 6)*

down a 1/8th inch hole to test the level of the coins. This is usually done only when the coin receptical is so full that the coins may back up into the coin relay.

Should the craftsman find any money, no matter how little, in the upper section, he must call the test board and deposit the found money in the PT, this is then totaled by the test board. The craftsman next writes up a collection ticket showing that the money was deposited. In the event of the coin box being full to the point of overflowing, the craftsman will call a special collection man, who will come out and empty the phone at once.

Occasionally there are certain craftsmen who do not follow the above precedure and pocket the cash instead. These men do not last long, as telco security is constantly springing traps on unsuspecting craftsmen to test their honesty.

Craftsmen are also required to sign for the keys they posses, which open the upper housings of all PTs. This is to insure against a craftsmen giving in to his vices and selling the keys; besides, the upper housing key is stamped and die-cut on a special blank manufactured only by and for the telephone company.

So that explains the craftsman; now we will look into what he does in terms of actual repair and maintenance procedures he performs while on the job. For illustrative purposes, we will assume that the craftsman has been called out to inspect 555-9368 for a possible OD condition, the nature of which is as yet undetermined.

Upon his arrival, the craftsman will open the upper-housing of the PT with his 29a upper-housing key. He will then swing the housing out to a position perpendicular to the wall mounted portion. Then, he will attempt to determine the physical location of the OD condition in the PT. Having done so, he will fix and/or replace the faulty part, and write his ticket up as repaired. He will then move on to the next assigned repair location, initiated by the same repair call procedure; which continues this repair cycle. □

DTS *(Continued from Page 7)*

A second objective is to make seperate measurements for groups of customers who have distinctively different Dial Tone Speeds because of equipment configurations. Thus, TOUCH-TONE and Dial Pulse service are measured seperately. And, in No. 1, Panel or SXS, MR, FR, and COIN are measured separately.

A third objective is to make the study in the hour appropriate for the service. For Indexing, Traffic Engineering and similar purposes the practice clearly states how the hour is to be chosen.

The general prochedure is as follows:

1. Establishing loading divisions and their busy hours.

2. Provide one or test lines per line group or line link frame for panel or crossbar offices depending on office size, and one test line per line finder group for SXS offices. There are some additional recommendations concerning the number of lines for coin groups and SXS primary line switch groups.

   This assures that the DTS measurement reflects all of the line groups. This does not allow for weighting groups within a loading division, but it does not allow the variations in service resulting from imbalance or other reasons to be reflected in the measurement.

3. Within each line group select particular terminals so that the sample represents average hunting time and the results are representitive under all degrees of loading. For example, when preference is normally given to certain lines such as Vertical group 02 in No. 5 crossbar offices; or the lower numbered terminals (panel) or first rotary positions (SXS) the test lines are to be proportionately distributed to all levels of lower preference terminals to obtain average results.

4. To achieve results during overloads further steps are taken by assigning a proportionate number of test lines in each Line Load control catagory. For example, in an office with the % of lines in catagories A, B, and C of 10%, 45%, 45% respectively, the test lines would likewise be proportioned.

No. 5 Crossbar With Local Overload Announcement Facilities

In No. 5 Crossbar offices equipped with the Local Overload Announcement, special measures for assigning lines and computing DTS results are required. When the announcement feature is actuated, the DTS test lines will not register any delays except under very heavy overloads, No delays would be recorded because to the DTS Register Circuit, the siezure of an announcement line would appear as an immediate return of dial tone.

By arranging the office for Dial Tone Speed measurement as recommened, the lines that are denied access to the announcement circuit are made to wait for dial tone. The measure of their DTS is then used as an indicator of an "equivalent office average speed". □

A LITTLE LEXICON

(In each issue many terms are used which may be foreign to some of our readers. A new feature which will appear at regular intervals will be A LITTLE TELEPHONE LEXICON.)

This LITTLE TELEPHONE LEXICON will discuss:

Multi-frequency Tones

Multi-frequency Tones (MF) are the basis of modern telephone switching. The MF system uses 6 different tones combined in pairs to form 15 sets of paired tones. These 15 tones represent the numbers 1 through 10, two special tones, *Key Pulse* (KP) and *Start* (ST), plus 3 others used for special purposes.

The operator has a dialing pad, much like a standard TOUCH-TONE "dial". When dialing a call the operator keys KP then the desired telephone number and finally ST. This is normaly written as KP + 7D + ST. "+" simply means –followed by – and is called plus.

The KP tone signals the automatic dialing equipment that a call is about to be placed. The ST tone signals that all of the numbers (called a *signal train*) have been keyed and that the equipment may complete the call.

HOW PHONE WORKS

(Continued from Page 7)

electricity can travel along a wire conductor and be "boosted" (amplified) whenever required. The telephone changes voice sounds into a stream of electrons capable of traveling in an electrical circuit.

Sound to Electricity–and Back Again

The way the telephone sends a voice along a wire is to convert the sound pattern into a matching electrical pattern. At the other end of the line, the telephone reverses the process. It changes the electrical back to a matching sound pattern.

The telephone performs this "magic" by means of *transducers*. Transducers are devices which convert one form of energy, such as sound waves, into another form, such as electrical waves.

There are two transducers in the telephone. The *transmitter* converts sound waves into electrical waves. It is located just where you would expect it–inside the mouthpiece.

The *receiver* converts electrical waves into sound waves. It is, of course, located inside the earpiece.

Placing A Call

Of course it takes more than a transmitter and receiver to make a telephone call. First, you need an electrical circuit between your telephone and the telephone you want to reach. But there are over 100 million telephones in the United States. How is just one of them found and connected? This is the job of the telephone *central office*. All telephones are joined to special equipment in central offices throughout the country.

At one time all connections were made by telephone operators. To connect one telephone to another, the operator used a flexible wire cord on the switchboard. At each end of the cord there was a slender, blunt rod called a *plug*. One plug was placed into the socket (called a *jack*) connected to the line of the telephone making the call. To make a connection, the operator pushed the plug at the other end into a jack connected to the line of the phone being called. The plugs and jacks acted as switches, completing the electrical circuit.

Today most local and many long distance calls are dialed directly by the telephone user. But operators are still needed to assist on such calls as person-to-person, collect and credit card calls. Others handle special services such as information and calls to mobile telephones. When you make a telephone call, thousands of "off-and-on" switches called *relays* go into action. It is the telephone you use that sets these relays into operation.

Dialing and Switching

When you pick up a telephone handset, a switch inside the telephone closes, and the current flows through the telephone from the office. There, a relay closes, putting your telephone in the circuit with the equipment that will put your call through. The dial tone tells you that the circuit is now closed and the equipment is ready for your call.

Suppose you want to dial 555-2368. The first three digits identify the central office of the telephone you wish. The last four digits specify the phone you want in that central office. For long-distance calls you dial at least ten digits. The first three digits, in such a call, indicate the area you wish. For example, 212 is the area code number for New York City.

But back to your local call, 555-2368. You begin, of course, by dialing 5. When you release the dial it interrupts the circuit five times. Each interruption causes a capacitor to build up a small charge. When the circuit is closed again after each interruption the capacitor discharges it's charge and causes a pulse on the line. For the number 5 this occurs five times. Each pulse causes a relay in the central office to repeat the pulse, 5 times when you dialed the five etc. Where touch tone is used the relay is sensitive to the tones of each number.

When later pulses, or tones reach the central office, they set many more relays into operation. Each relay that closes is another connection, another link, in extending the electrical circuit. Each closed relay brings the circuit another step closer to the person you wish to talk with.

The first three groups of pulses (or the first three tones)–from the first three digits you dial–close relays to connect you with the particular central office you are calling. (If the number you are calling is in your own central office, the first three digits tell the

(Continued on Page 12)

HOW PHONE WORKS

(Continued from Page 11)

central office equipment to handle the call itself.)

After you reach your friend's central office, the last four digits you dial close more relays there to extend the circuit to his telephone. Each digit you dial opens another "doorway" to his telephone; a final group of relays sends a signal to his phone, connecting and ringing it.

When your friend answers, he lifts his handset and the buttons below it spring up and close a switch in the base of his telephone. This is the final link in the circuit from your telephone to his. When you answer your phone you cause two things to happen. First the ringing is stopped and second the equipment starts to bill the calling party if it is a toll call. When you finish talking and hang up, all of the operated relays and switches release to free the equipment for another call.

If there were only a few telephones in the world, connecting them would be quite simple. But, as the number of telephones increases, the number of possible connections grows faster. There is a simple formula for figuring this: $X(X-1) \div 2$ with X representing the number of phones in a system.

OVERSEAS DIALING

(Continued from Page 4)

service. As explained before, the "XXX" dialed by the operator represents the country code. It is derived in the following manner (this applies to MF tones only and not IDDD): If the country code has three digits they are the "XXX". If the country has a two digit code, a "0" or a "1" is placed before it, the "0" is for satellite and "1" is for cable. Sometimes one route may be busy, or the country only accessable through cable. For a one digit country code, the code is preceded by the "0" or the "1" and followed by a "1". For example, Germany by satellite would be "149", while Russia by cable is "071".

The already mentioned code "011" automatically "finds" the proper route. It is possible, however, to *force* a particular routing by demanding a certain *overseas calling center*. There is one alteration when using this method. The key sequence is changed to the following—

KP + 182, 183 etc. + ST [redacted]
KP + XXX + City Code [redacted]

Seven of these exist in the U.S. as follows:

182	White Plains
183	New York
184	Jacksonville
185	Oakland
186	Denver
188	Montreal

Jacksonville is the center for S. America while Oakland serves the Pacific area. Where a call is to be "forced" through a specicic *overeas calling center* the code for that center is dialed in place of the regular overseas access code "011".

In cases where a city code is unknown the *Rate & Route* operator may be consulted, she is reached by dialing (MF tones only) KP + 141 + ST. Then ask for the IOTC route for the desired city and country. Foreign *Rate and Route* may also be reached by dialing the 141 code after the desired country code. Inward operator (121) and Directory Assistance (131) may be reached in a similar manner. There is no language problem since all international operators speak english – it's the international telephone language.

If you can't "afford" to call overseas you can still hear what foreign ring and busy signals sound like. Try the following, all in the 212 area code:

363-8888	Norway/Sweden
363-8849	Switzerland/Denmark
363-8889	Italy/Luxemburg
797-8029	Greece/Spain
797-8079	Australia/Japan
797-8729	U.K./France
797-8798	Belgium/Germany

If you have the "stuff" to be able to spend a lot of time on European calls some of the following numbers might be of interest:

In Hannover, Germany, city code - 0511;
119, 11531, 1161
11511 & 1164.
In London, England, city code 1;
246-8099, 246-8021
& 246-8000.

As a note of closing there is a companion tone to our 2600Hz clear tone in Europe, it's 2400Hz, and may have a myriad of uses, such as calls routed through Paris on their way to L.A. □

IRS

(Continued from Page 5)

against the totals you entered. If the numbers don't match, the computer kicks out your return and sends it to the "input perfection" department where a human being decides what the problem is.

The computer doesn't have a data bank against which to check your return. It doesn't, for instance, have copies of all your W–2s to make sure you listed all income. That check would come later, if at all.

If you used the long-form tax return—usually known as the 1040—all the information IRS needs to decide about your refund and whether you should be considered for audit is contained on about half an inch of magnetic tape.

If you used the short form, it takes a quarter inch or less.

The Fresno center sends about 10 reels of tape a day to the IRS national data center in Martinsburg, Va. Each reel has information on more than 120,000 individual tax returns.

If your return was rejected by Fresno's computer, you normally will hear from the center's "correspondence audit" division, which handles simple corrections and disputes.

"It's not a formal audit in the eyeball-to-eyeball sense," an IRS spokesman said. "We serve notice that we consider something incorrect and 92% of the taxpapers accept the adjustment."

Into this category fall people who made obvious mistakes—claiming their dog in an exemption, for example, or incorrectly calculating the standard deduction.

Few other audit decisions are made at the Fresno center. IRS top officials make most of them, and the computers at the Martinsburg facility pick out most of the returns for review.

Basically, IRS says, returns are selected for audit in two ways—through random selection and a complicated process known as the discriminant function test, or DIF scores.

IRS sets up various tax return categories including wages, deductions, exemptions, and other income. Using averages on past returns and other, more confidential methods, IRS establishes a "DIF" score against which your return is matched.

Simply exceeding an average in one category—medical expense deductions, for instance—won't necessarily set off the bells on the computer, but it will figure into the DIF score. If enough categories on your return exceed DIF limits, you will be considered for audit, IRS says.

DIF scores are constantly changing, based on IRS intelegence and problems identified in past auditing experience.

The "random selection" IRS uses to find other returns for audit really isn't so random. Tax officials say that, to study special areas, they will ask regional centers to select a number of returns with specific features.

"We might be asked to select 600 returns with dividend income over $1,000," one tax official said. "It's random selection, but within certain limits."

If you are choosen by the computer or through the random process, the IRS sends your return to a preaudit stage, where officials determine whether a full-blown audit would be worthwhile.

Of the more than 80 million individual income tax returns filed last year, 2% or 1.6 million were given a full audit. IRS hopes to boost the percentage this year, but odds are still good you won't be called.

Of course, if you have been audited in the recent past or if your income is in a top bracket the chances you will be audited this year are much higher.

Only the IRS computers at the national center in Martinsburg are programmed for the DIF score test. If you're among those selected, a tape with your return's information is sent back to Fresno which then forwards your return to the local IRS district in which you live.

Full audits are conducted at the local office.

The Martinsburg facility also makes the decision on refunds. It's computer prints a tape with names, addresses and amounts which, in the Southern California region, is sent to the San Francisco Treasury disbursing office which in turn mails out the refunds.

It takes about a week for the average return to make it through the Fresno center. But by the time the information gets through the national computers and makes it back to your regional office, the average refund takes about six weeks to reach your mailbox.

The Watergate scandal and revelations of alleged misuse of the IRS for political

(Continued on Page 14)

IRS *(continued from page 13)*

purposes raised some questions about the agency's storage and safeguarding of tax information.

At the Fresno center, security is tight and highly visable. About 30 private guards watch every entrance, and everybody wears a badge. Visitors are never allowed to get near employees while they sort and examine tax returns.

(Information on tax forms is, by law, confidential.)

They also microfilm tax returns at Fresno, and the film is kept on file for three years. The actual papers themselves are stored at Fresno for a year, then shipped to the Federal government's massive document storage facility at San Bruno, Ca., which normally keeps them for seven years.

And the Fresno facility's officials point out that not a single tax document is ever destroyed there, except for the 22 million envelopes they arrive in.

They are obliterated in a pulping machine, and the city of Fresno uses the residue as landfill. □

classified advertising

Starting with this issue TEL will accept display and classified advertising. Classified ads cost $1 per line. A line contains 40 characters, including spaces and punctuation. A box service is also available for those who prefer not to receive replies at their home address. The charge for a box is $2.50 per ad and includes forwarding of all replies by first class mail. Your address will be kept confidential.

Payment for classified advertising must accomany your order.

Also begoning with this issue, TEL is accepting display advertising. The minimun display ad size is 1/8 page. Please apply for rates.

The address for all advertising is TEL, Dep't. DA, 22035 Burbank Blvd., Woodland Hills, CA 91364.

EUROPEAN- phone phreaks, I will be in Germany this summer and need info on how to DO IT in Europe. T.G. Box 47 TEL.

TELEPHONE- equipment. dials, relays, plugs, line cards, cords, switches, networks, key units, interupters and much more. Write for list and prices. Some quantities limited. Write today to. Phone Stuff, P.O. Box 131, Cotati, CA 94928

PRESENTLY- have speakerphone, w/on-off buttons on mic, for key phone. Need wiring diagram as unit will not work on Centrex but will work in my next building, which is equipped with PBX and dial 9 for outside, system. R.W. Box 29 TEL.

USED- Pitney Bowes model 75-R Metal address plate embossing machine. Cost over $5,000 new, only $1,500. FOB Woodland Hills, CA. Very good condition. Circulation Dep't. TEL

TEL FOR THE BLIND

TEL is now available on cassette tapes for our blind readers. The current price of $24 per year includes a copy of the regular TEL along with each tape. Single tapes are $2.50 each, with a copy of TEL.

TEL cassettes are complete spoken versions of the regular issue, nothing is left out. In fact, the tape is "illustrated" with appropriate sounds and tones.

To order, write TEL for the Blind, 22035 Burbank Blvd., Woodland Hills, Ca 91364. Please enclose payment with order.

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now available for the telephone experimenter

COMPLETE CONSTRUCTION PLANS

TELEPHONE PLANS: $3.00 each.

Answering Device
Automatically answers the ringing line, plays a pre-recorded announcement, takes the calling party's message, and hangs up.

"Black Box"
Device that the FBI uses to wiretap and monitor telephone conversations silently, from a remote location from the phone.

Call Limiter
Stop those long-distance calls made by your friends! Device disconnects all long-distance calls from your telephone line.

Central Dial Exchange
Now you can call the other end of your house on your private telephone system. Great for the office without a PBX system.

Recorder-Actuator
Now you have the capability of recording telephone conversations automatically every time the phone is in use.

Schematics
The basic schematics and parts lists for commonly used telephones. Includes a description of the telephone network.

Telelink Burgler Alarm
Use the telephone line as a link to notify you when intrusion occurs. Great for babysitting purposes and remote applications.

Automatic Dialer
Automatically dials a stored number in its magnetic memory. Takes Touch-Tone or Dial and stores hundreds of numbers.

Call Diverter
Answers the ringing line automatically and dials a pre-recorded number to divert the original call to a remote location.

Conference Bridge
Automatically puts your friends on a giant conference as they call in. Have three or four way calls from your home phone.

Melodic Ringing Generator
Add harmony to your phone. This device eliminates conventional ringing and produces a melody with each ring cycle.

Remote Control
Before you leave work, call your home and utilize this device to turn on the stove and heat your dinner. Avoids burglars too!

Speakerphone
Enjoy hands-free conversation on the Speakerphone. Similar to Bell System type, but uses two-way transmission instead.

Voice Scrambler
Talk and listen to your friends in the normal manner, but good luck if someone else tries to monitor the conversation.

ELECTRONIC PLANS: $5.00 each.

Biofeedback Conditioner
Monitor the fluctuations that your brain produces and learn to put yourself in any mood desired. Completely harmless.

Multifrequency Encoder Network
New IC version available uses op-amp output very easy to build

Horticulture Stimulator
Stimulate plant growth as much as 300%. Can be used on a particular section of the plant or on the entire plant itself.

MISC. PLANS:

Dodecahedron Speaker Enclosure $7.50
Unique twelve-sided enclosure enhances response from any speaker. Unusual design adds to any home decor. A must for the audiophile and design engineer.

Photographic Pinhole Camera $3.00
Small, compact, easy to build camera costs only the price of the film cartridge. Plan includes proper exposure setting tables and film types that produce best results.

THE LEGAL ASPECTS OF INTERCONNECTION

The complete reference book on the legal rights of the telephone customer. $29.95, postpaid.

Due to unexpected developments in the legal arena, the book has been pulled back from the printers. We felt that to publish at this time would be to print a book that was obsolete from the outset. TEL has engaged a well known Telco fighter from New York to revise the book prior to an early June printing. The book will contain excerpts from relevent chapters of the tariffs. This book is drawn from extensive research by our staff, and experts in the field. We will let you know exactly where you stand in the area of interconnection. This book could save you many times it's cost. To keep you informed on what is happening in this area we will send an abridged copy of our original edition to all those who order before June 1st. don't let this one go by!

ALL OF THE CONSTRUCTION PLANS ABOVE ARE AVAILABLE FOR $24.95 WITH "LEGAL ASPECTS" BOOK $49.95 AIRMAILED

TELETRONICS COMPANY OF AMERICA, P.O. Box 3486, Hollywood CA 90028 USA

VOL 2, NO 3 • APRIL 1978 • FIFTY CENTS

TOUCH TONE SPECIAL

What It Is
What It Does

Anatomy Of A Phone Bust

TELEPHONE ELECTRONICS LINE
22036 Burbank Blvd.
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Editorial

By Jack Kranyak

It has recently come to TEL'S attention that Pacific Telephone has more than passing interest in our publication. About two weeks ago we recieved, in the space of a half an hour, two rather disturbing phone calls. Neither caller identified himself but both conveyed similar messages. The gist of which was that the Pasadena office of Bell telephone security was expressing the view that TEL would soon be out of business. Both callers had been told that telco security and legal departments were aware of us and "going to do something about it."

After a few moments nervous chatter we decided that the best aproach would be to confront Ma Bell's agents ourselves and find out what was up. The first call to the Pasadena number found the security officer "out for a second" and illicited a promise that he would return our call on his return. Two hours later we tried again, this time the object of our inquiry was "in". We mentioned the phone calls we had received earlier in the day and asked what it all meant. The reply was not what we had expected. We were told that there was no move afoot to close TEL down, but that the security department was of course aware of us. Upon further questioning it was admitted that the telco legal department was working on something but what it might be was not disclosed.

We assumed that our informants had misunderstood or over reacted to their conversation with the security department. However, when later that same day one of the original callers reached us again, he played us a tape of his conversation with Pasedena.

On that tape it was very clear what Bell's intentions were. They mean to close TEL down by whatever means possible. It is their contention that we are advocating defrauding the phone company as well as other illegal acts. Let us take this opportunity to "make this perfectly clear" TEL publishes it's articles for the purpose of informing the interested public what is happening in the world of telephony. It is a fact of life that toll fraud exists. The telephone is perhaps the most common thing in America, just about everybody has one. The average subscriber spends well over $90 a year for the use of this magic communications device. It is also a fact that for all intents and purposes the Bell system has a monopoly on telephone and long distance communication. Even where independent telephone companies exist, they must use Bell trunk lines to communicate with phones outside their own area. It is no wonder that so many Americans are fascinated with the Telephone system. "Cheating" the phone company while "that wouldn't be right" is a fact of American life.

Our magazine is about the telephone, and we report on all aspects connected with it. We epmhasize, TEL does not in any way encourage any illegal actions directed toward the phone company, or for that matter toward anyone. But just as America was spellbound by the cheating of "Watergate" so is Ma Bell just as alluring to many of us. There is a small pleasure felt by many in reading that someone has put it to her. □

Touch-Tone:

what it is what it does

700-900-1100-1300-1500-1700

by JOHN REYNOLDS

Touch-Tone dialing has now been with us for over ten years. In that time it has made great changes in our telephone system. Many of these changes are not at first obvious to the average subscriber. The situation is analagous to putting a turbine engine in a regular auto body, the controls remain basicaly the same, but the machine is totaly different. What is Touch-Tone all about? Read on!

The need for the pushbutton telephone, as opposed to the standard rotary dial is not based on any one factor. Important considerations in the development of a pushbutton system were the need for faster dialing as well as the need for more accurate dialing. But an even more important reason was probably the greatest factor in creating Touch-Tone; the need to be able to transmit information (data) over the telephone lines.

The signals generated by a rotary dial are DC pulses that can only control local central office equipment, opening and closing circuits each time a digit is dialed. Further dialing after a connection has been made results in interruptions in the voice pathway. Even more important is the fact that there is no DC continuity between the calling and called telephones. This makes it impossible, without special equipment, to transmit the DC pulses.

Touch-Tone phones, however, generate AC signals in the voice frequency range that come out sounding like musical tones. These tones, or signals, pass through the central office equipment just as regular conversation would. They can therefore be transmited nationwide or worldwide. With a device at the other end to interpret these additional tones, the line can be used for functions other than talking. The banking business was one of the first to to put Touch-Tone data systems into operation and is using them for handling account transactions, billing and credit authorizations.

Touch-Tone dialing is an offshoot of Multi-frequency (MF) switching, which has been in use on toll and dial service assistance (DSA) switchboards for many years. It was never adapted, however, to consumer telephones because the system required proper filter circuits to guard against voice interference. A further reason for adopting a different pushbutton system for consumer use was that special equipment would have been required to keep subscribers from using the original MF tones to place free long-distance calls. Phone Phreaks have none-the-less managed to create their own tone encoders and are a constant irritant to the phone company. The original MF tones are shown in the following table.

MULTI-FREQUENCY SIGNALING CODE

Digit	Frequencies (Hz)	Digit	Frequencies (Hz)
1	700 + 900	7	700 + 1500
2	700 + 1100	8	900 + 1500
3	900 + 1100	9	1100 + 1500
4	700 + 1300	0	1300 + 1500
5	900 + 1300	KP	1100 + 1700
6	1100 + 1300	ST	1500 + 1700

Eight frequencies in the 700- to 1700-Hz range (the same range as for MF) comprise the four-by-four code designed for Touch-Tone dialing. The 8 frequencies, selected to avoid harmonically related interference from speech signals, are divided into 4

(Continued on Page 13)

Construction Project

add four new tones to your telephone

by MONTI RIEMAN

Have you ever heard anyone talk about 1633Hz. The 1633Hz tone is one of the Touch-Tone signaling tones used by the telephone company. It, when paired with other tones, can be used to access computors, loop-arounds for call conferencing, and a variety of other uses. Now the question is, how hard is it to get the 1633Hz tone? If you have a special use for it, the telephone company will install 16 button Touch-Tone pads. Or you can modify your existing Touch-Tone phone. Once you have the 1633Hz tone, you will have four new numbers on your Touch-Tone pad.

The first questions that come to mind are, how hard is it to modify the Touch-Tone pad? How long will it take? How much will it cost? Simple, 30 minutes, and about $1.00 to $2.00 for a SPDT toggle switch (Radio Schack Cat. No. 275-613, cost $1.29) or similiar. First you obtain a switch, how it is done follows.

First unscrew the screws on the bottom of your telephone which hold the cover and remove it. Look for the Touch-Tone pad and the supporting bracket it is on. Loosen the screw holding the Touch-Tone pad on its supporting bracket. Carefully remove the pad (be sure not to remove any wires) and remove the thin plastic protector on the top of the pad. Undo the protector on the bottom of the pad and let it stradle the wires leading through to the Touch-Tone pad.

Locate the two toroid transformers that generate the Touch-Tone frequencies. They are the big doughnut shaped things on the underside of the pad. If the transformer on the left has a plastic protector on it, take it off. Now locate the 3-pole terminal strip on the bottom edge of the pad about one-inch down from the toroid transformers. Find the terminal on the left and separate the two pieces of joined metal being careful not to break them off. Take a one-foot piece of insulated wire and strip about 1/8th of an inch off both ends. Take one of the ends and solder it to the outside half of the separated terminal (it is slightly off the edge of the P.C. board). Take another piece of wire the same length and solder it to the other half of the terminal. You should have some way to identify this wire from the frist one. Make it another color or put a piece of tape on the end of it. Twist these two wires together for now.

(Note: On some Touch-Tone pads the terminal strips are replaced by a yellow-orange wire. If this is the case, cut the wire in the middle and strip the two new ends. These two ends will correspond to the above mentioned terminals.)

Locate the toroid transformer on the left. There should be two strips of five solder

(Continued on Page 17)

CENTRAL OFFICE OPERATIONS

step-by-step exchange

by DAVID REESE

In a step-by-step office each telephone number has a location in a large matrix called an *intermediate distributing frame* and from there it is connected to a device called a *line finder*.

The line finder is a piece of equipment with ten steps up and ten steps accross. At each of these steps accross a customers line from the intermediate distributing frame is connected. The line finder has a pointer (called a wiper) which can make contact with each of the ten steps accross. You might think of it as a ladder such as used in libraries, which allow the user to climb up as well as roll the ladder along to a different position. A linefinder may serve as many as two hundred customers, depending on the class of service and average percentage of calls.

When the telephone receiver is taken off the hook the line finder is alerted that you wish to make a call. The unit then searches for your line and connects it to a first selector, which when selected produces dial tone. This is an indicator that the selector is ready to receive dial pulsing. Each linefinder is connected to a first selector.

The selector is also a piece of equipment with ten steps up and ten accross. The wiper rotates accross the contacts until it finds an idle one. This process is a search for a second selector. If, for example, the first number dialed was a four, the wiper of the first selector steps up to the fourth level or step. The wiper then rotates accross the contacts until it finds an idle or unused second selector. This process is repeated as you dial, each digit signalling a position to a stepping switch. or first through fifth selector, until the connector *stage is reached.*

(Continued on Page 19)

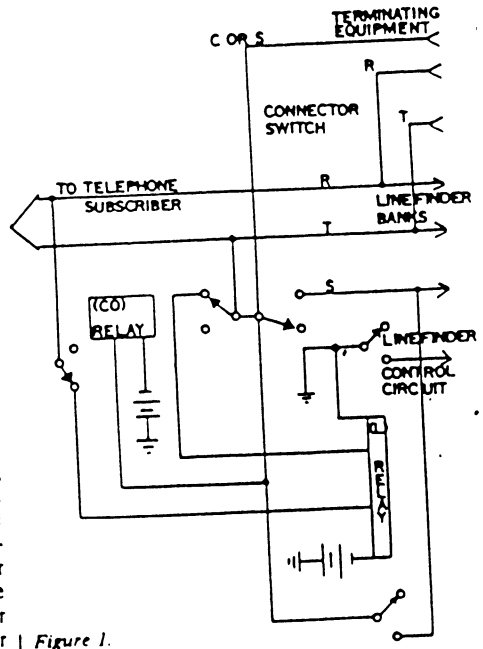


Figure 1.

T and R... Talking leads commonly called Tip and Ring
S..... Make-busy control lead
C..... Make-busy control lead associated with connector switch

Note that the circuit for operation of (L) is through the normally closed contacts of (CO). If relay (CO) should be operated on an incoming call (L) cannot operate. And, when (CO) operates in the first stage of an outgoing call (L) will release.

On an originating call, the operation of relay (L) usually causes the following actions:

1. *It connects the battery potential through the normally closed contacts of the (CO) relay to mark the calling line's position on the linefinder banks.*
2. *It grounds the ST or linefinder control lead to start a linefinder selector hunting for the calling line.*
3. *It prepares a circuit to make-busy the calling line to other calls. When the linefinder selector connects to the calling line terminals on the linefinder bank the (CO) relay will be operated, removing (L) from accross the subscriber's line and will make busy the calling line to incoming phone calls by extending the ground condition of the S lead to the terminating equipment. The release of the (L) relay will remove the ground state from the ST lead to free the linefinder control circuit.*

Anatomy Of A Phone-Bust or "how to get caught"

by BENJAMIN DOVER

I started phreaking several years ago as a result of an article in the October 1971 issue of Esquire magazine, but I was never in contact with any other "phone phreaks". I designed and developed my own "box" which was about 6 x 3½ x 1½ in size. After getting the bugs out, I used my box for about a year and a half.

Then, in the winter of '73 my Uncle got busted (I had made him a box too). Since my wife worked for Ma Bell it didn't ta long for them to get their suspicions and put a tap on our phone. Then March 10th, our apartment was raided Bell and their gestapo stooges. Fortunat I had a little warning because they a tried on March 9th at 7 o'clock in morning but didn't get an answer.

After tearing our apartment apart, and the process stealing some good porno t they had no damn business taking, I w told that probably nothing else wo happen. Let this, however, be a lesso on March 20th I went to work at 11p (The D.A.'s office knew I worked nigh and at 11:45 the local cops arrested wife on California Penal Code 702 (b fraud, a misdemeanor. I went to out as soon as I heard what ha and they arrested me too! The bail $300 each, more than we had, so I had get a bondsman to bail us out.

I asked the cops w they had served the warrent so damned and they said that the D.A.'s office had given them those instructions.

On March 24th my wife was suspended from her as a frameworker at Pacific Bell. This job had nothing to do phreaking, there were no parts of information which she could have supplied me even if she wanted to, she simply didn't have access to such things. (The phone company security people admitted this as well).

I saw no easy way out and hired the Law Offices of Richard Monroe in Los Angeles since they were reputed to have luck in fighting the Big Bell. in attorney's bills, I ence" (ie. a Blue conviction. The onversations, in- gs was evidence vidence in court.

expert witnesses court, and a bill beat the rap. So o contest"as part to pay the phone em (about $140) probation. They ll charges against

ent to court and Beverly Rance, the search to pt the plea but balked when ferred to the pro- or to sentencing and order ar before her again in one month.

The probation officer tried to get me to admit that I still had a box, was still operating and that I had, in fact, made more calls than I had been charged with. I refused to play his game so he decided to stick it to me. He recommended both jail and probation, even though the phone company didn't want to press for jail at the time.

Back in court Judge Beverly, who has a reputation for being an old battle-ax. was

(Continued on Page 20)

IAL TONE SPEED MEASUREMENT

part three

is article is the third in a series of articles ng with telephone company plant engineer- and maintainance. It is primarily intended knowledgeable enthusiasts and plant em- yees who have a background in this field.

h month a topic will be investigated as we progress into the field of telephony.

TIMING CIRCUITS

Testing and Calibration

Effects of Timing Error

he effect of the fourth source of meas- nent error is to be minimized, attention maintaining an accurate three-second ing interval is required. The effect of ing circuit errors on measurement error llustrated below using a No. 5 Crossbar ation. In this demonstration two impor- t assumptions are made:

. The other sources of measurement error are ignored.
. Dial Tone Delay is caused entirely by one component or groups of components. (The No. 5 Crossbar Origination Registers in this instance.)

ither of the above can be totally ignored considering the Total Measurement ror. In considering the measurement or of the DTS timing circuit alone, the cond assumption becomes less appro- ate as overloads increase because other mponents such as Channel Blocking and al Tone Marker Delay do contribute sig- icantly to Dial Tone Delay. The add- onal assumptions that have been made r this illustration follow:

. No. of Originating Registers. 25
. Register Holding Hours. . 12" Variable
. Service . . . . . Order of Arrival
. Delay Curve
. Number of Sources . . . . . Infinite
. Timing Circuit Settings
  A. 3.0" (Correct)
  B. 2.7"
  C. 3.3"

he illustartion gives a comparison for the ree occupancy levels (.70, .80 & .90) corresponding to typical ABD and 10-high day loading conditions. A comparison of the apparent DTS% over 3 seconds as measured by the DTS register circuit is made as shown below:

Step 1: Compute T/H for

the apparent DTS% over 3 seconds as measured by the DTS register circuit is made as shown below:

Step 1: Compute T/H for each Timing Circuit as follows:
  A. For 3" setting. T/H=3/12=.250
  B. For 2.7" setting, T/H=2.7/12=.225
  C. For 3.3" setting, T/H=3.3/12=.275

Step 2: From Approximiate Delay Curve Determine the % over T/H for each set of conditions.

The results are tabulated below:

Apparent DTS% over 3" from DTS register circuit (D/T x 100) for Timing Setting of:

Seconds: (T/H)	3"* (.250)	2.7" (.225)	3.3" (.275)
Occupancy			
.70	1.0	1.2	0.8
.80	6.0	7.0	5.4
.90	28.0	30.0	26.0

* correct setting

Recall that these are aproximate, for illustration purposes only, and substantially less appropriate for the higher occupancy levels wherein overloading occurs and other components inroduce actual delays. However, they do demonstrate the effects of inaccuracy in the 3" Timing Circuit. It is for this reason that precision in testing the Timer Circuit is essential.

METHODS OF DETERMINING ACCURACY OF TIMING CIRCUIT

The accuracy of the timing circuit can be appraised both by observing the number of tests shown by the Test (T) Register and more accurately by using a stop-watch and observing the stepping of the selector switches.

Observing the number of tests in one hour is simple and should be done for every day the dial tone speed is measured. To do this it is necessary to compute the the number of tests to be expected in the measurement period and to compare the actual number of tests to this standard.

A more exact test is one which will disclose the need for re-calibrating the timer of the vacuum-tube timer, or servicing or replacing the synchronous timer. It is done by using a stop watch. Recognize that the central office maintainance forces will be involved in this procedure.

Because of the differences between the two timing circuits, the procedure for applying these two techniques are described separately.

Cold Cathode Tube Timer SD-96403-01, using the number of tests (T) registrations:

1. General—The timing device of tube-type dial tone speed equipment is variable. It can be calibrated so that the dial tone speed tests will be made at approximately 3 second intervals.

   The maximum theoretical number of hourly tests registrations is 1200. The actual number, however, depends on:
   1. Number of test line assignments
   2. Distribution over DTS machine arcs.
   3. Number of Delays

   The expected number of hourly registrations must be computed separately for each DTS machine and must be taken into consideration in judging the validity of dial tone speed results.

2. Frequency of computations—The expected number of hourly tests registrations should be computed at the start of each busy season for various delay conditions expected during the coming busy season; after an equipment addition and after a change of assingments.

3. Method of computation—To compute the expected number of registrations for one hour the time interval for four steps of the operation of the equipment must be considered.

   Test of assigned terminal. . . 3 seconds
   Transfer to next assigned arc 1 second
   "Delay" encountered. . . . . .1 second
   "Sweep" of arc with less than 10 terminals assigned . . . . . .1 second

Table 1 shows a sample computation for an office which averages 24 busy hour dial tone delays.

Time per cycle = 173 seconds
Cycles per hour =

$$\frac{\text{Seconds in One Hour} - \text{No. of Delays}}{\text{Seconds Per Cycle}} =$$

$$\frac{3600 - 24}{173} = 20.6$$

20.6 cycles means that in the, 21st cycle 6/10 or 34 (.6 x 56 = 33.6) of test terminals were scanned. Therefore, in the last cycle scanning was stopped after the fourth terminal af arc A-4 was tested.

4. Daily Check of Calibration
   A. Make daily comparison of the actual number of hourly test registrations with the expected number of registrations. Comparison should be made of both the

(Continued on Page 20)

Frame Class of Service:	FLAT RATE		MESSAGE RATE		COM	
Loading Division: T	26 SEL 373	30 SEL 375	26 SEL 377		15 SEL 379	Total
Register Assignment: D	374	376	378		380	
Arc:	A-2	A-3	A-4	A-5	A-6	
Number of Terminals	20	20	20	20	20	100
No. Assigned	20	10	20		6	56
Test Time (seconds)	60	30	60		18	168
Transfer Time (seconds)	1	1	1		1	1
Sweep Time (seconds)	0	0	0		1	1
TOTALS (in seconds)	61	31	61		20	173

Construction Project • tv remote control

by FRED BLECHMAN

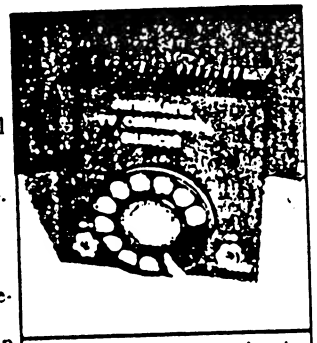
For years inventors have been trying to devise a system that would "kill" television commercials *without* "requiring" viewer control. At last this has been accomplished and TEL now furnishes you with an exclusive description of the first Automatic TV Commercial Silencer. Using the latest state-of-the-art methods in digital technology, and utilizing regenerative circuits incorporating iterative logic, the Silencer automatically senses when a commercial is being broadcast, and "kills" the speaker of the TV. When the regular program material returns to the screen, the sound comes back on automatically.

Operation of the Silencer sensing network is based upon time-scan sequenced search-mode discrimination, allowing it to distinguish between the normal telecast and the commercial. The commercials are invariably a complete and radical departure from the regular program; if you're watching a wild western, the commercial is a sneaky, quiet one; if you're watching a tense, quiet drama, the commercial will feature sirens and gunshots. It is this programming contrast which forms the basis for the mode discrimination circuits in the Silencer.

Obviously, there are many types of TV shows, and the Silencer must be able to work with them all. The Silencer is "programmed" at the beginning of each show for the characteristic content and format. Notice the telephone dial in the photograph of the unit, by dialing the proper digital sequence, you program the Silencer to differentiate the commercials from the regular program material. Actually, when you dial the 3-digit code for the type of show you are watching, the dial contacts configure the logic matrix to accept certain key sounds, words and phrases from the program in progress. If these key indicators are not received by the unit repeatedly within discrete time periods, a commercial must therefore be in progress, and the TV speaker is disabled.

Some examples of the program parameters will help explain:

TYPE OF SHOW	KEY SOUND(S)
Mystery	3 gunshots in rapid sucession
Western	6 gunshots, followed by 6 dull thuds
Medical	"We'll have to operate"
Drama	Sobs, followed by hysterical nervous breakdown
Psychiatry	Hysterical nervous breakdown, followed by sobs
Adventure	Lion's roar, tiger's snarl, elephant's charge
Cartoon	Mel Blancs voice, any version
Comedy	"canned laughter"
Panel Show	Buzzer or bell
Wrestling	Grunts, groans and cat calls
Baseball	"...bullpen..."
Football	"...bench..."
Golf	....plink!
Tennis	....plink - plonk!



A different code number is dialed for each type of program you watch. This sets the logic and time-scan networks to discriminate the key sounds in the program material, and silence the commercial.

Unfortunately, while the system papameters and concept have been carefully worked out, some work remains to be done to complete the actual prototype. Based upon the latest estimates on the availability of the requisite quasi-metric filters, snitlatch memory cores and micro miniture laser modules, completion is expected around .... April Fools Day! □

PUC VS Telco

california ruling on interconnection

Consumers and businesses may soon be able to buy telephone answering machines, automatic dialers, data terminals and similar devices and connect them to their phone lines without paying installation fees or monthly charges.

The California Public Utilities Comission has issued an interim order that in effect undercuts the Bell System's near monopoly on telephone auxiliary equipment.

Until now, phone users who wanted to hook up their own equipment had to rent a protective "coupler" from the telephone company for $3.50 to $5 per month plus a $20 to $30 installation charge. The unit was intended to keep stray signals and high voltages from customer-owned equipment out of the utility's system.

But the PUC plan would eliminate the expense of the coupler—and thus encourage the use of non-utility equipment by making sure that independent manufacturers meet the technical standards set out by the agency in a 35-page manual.

If certified as safe by a registered electronics engineer or by American Telephone & Telegraph Co., the equipment could be hooked up without a protective coupler, the PUC said.

(Last summer AT&T said it would allow telephone answering machines with special circuitry approved by the PUC's order.)

Pacific Telephone & Telegraph Co., San Francosco, said after the PUC decision on Tuesday that it still believes the use of non-utility equipment will lead to service problems and higher costs.

The PUC order is subject to appeal to the courts, a company official noted, and PT&T's legal department is studying the matter.

It will be some months before devices bearing certification labels will appear on store shelves even if the issue does not go to court said Frank Widener, PT&T's director of regulatory activities.

The PUC order does not become effective until May 12. After that, registered electronics engineers will have to file their professional qualifications with the PUC, and manufactures will have to have their equipment checked and perhaps redesigned.

Meanwhile, the phone company will have to do some work of its own, Widener said. Its engineers are now desigining a special jack that will act as a "demarcation unit," he said.

If a customer reports trouble on a line connected to non-Bell equipment via a demarcation unit, Widener explained, repairman will be able to check the line up to these units without having to leave the central office. If the line is good, the company will tell the customer the trouble is in his equipment.

There probably will be a "token installation charge and maybe a small monthly charge" for the demarcation units, he said. These charges would have to be approved by the PUC.

The regulatory agency's order affects all the telephone companies in the state, not just PT&T.

It does not mean that customers who now have their own equipment connected to protective couplers can have those couplers removed, the PUC said, because there is up to the new standards.

The interim order is only part of a major policy review now being conducted by the PUC. Still to be decided by the agency is whether switchboards and other business telephone equipment should be connected directly to phone company wires. That decision is not expected for many months. □

Dear TEL,

I am in touch with a large number of muffers in both Canada & America and regularly contact muffers in the U.K., France, Singapore and Cyprus.

"Phone Phreak" is strictly a U.S. Telephone Company term that is promulgated widely and whose intention it is to denegrate the Blue Boxer. In Canada we use the term Muffer derived from Multi-frequency (MF).

One article on MFing that you failed to mention was published in the Toronto Sunday Sun in December of last year. It gave a detailed description of a blue box.

I and others up here are more than prepared to assist in the defence of any poor soul who might be caught practicing their art here in Canada. It has to be limited to Canada since our laws are very different from those in your country.

I think that's it for the moment, I am prepared to handle inquiries as regards Blue Boxing, routes etc., except for overseas routings—it's hard enough already. I would ask anyone writing to me for information to include a dime for the return mail.

For an excellent selection of telephone directories from all over the world, in the Toronto area, go to the reference section of the Roberts Library. They even have a Moscow (not Idaho) phone book. Also, the Bell Library has copies of the restricted DDD information—it's located on University Ave., in Toronto.

Jon Hewson
Box 757, Station B,
Willowdale, Ontario
M2K 2R1, Canada

TEL is pleased to announce the addition of Monti Rieman to it's editorial staff

COMING NEXT MONTH

"TRASHING THE PHONE COMPANY"

CO OPERATIONS – CROSSBAR

CONSTRUCTION PROJECT: PHONE BEEPER

Dear Sir,

I found your Vol. 2, No. 2 issue of TEL very interesting! I would like a personal response to a few questions. Would you please explain the legal and illegal aspects of the "blue box" and/or "black box"? Also, could you please tell me the differences between these two units? Further, is it illegal to use a device that allows you to make long-distance calls toll free?

I have heard that people who used "blue boxes" or similar devices to make toll free calls, and were caught, were fined something like $10,000! Wow! thats quite a stiff fine. Does that sound logical to you?

Anyway, keep up the good work. I'm sure glad someone has the power to make such a publication.

R.F.F.
VT

Sorry, we can't write personal replies, so here's your answer in print. A "blue box" is a device which duplicates the telephone company's switching tones, allowing the user to "route" his own calls. The term "black box" is used to describe two different devices. One, also known as a "mute", allows a phone to be answered without charge to the calling party. The other, for monitoring telephone lines, is better known as a "tap". Further, it is quite illegal to use a device to avoid paying long-distance charges, it is known as "toll fraud".

P.S. Logic has nothing to do with the phone company!.

Phellow Phreaks,

I am interested in computer games, and attend science-fiction conventions. I am also very interested in telephones and the TWX teletype network. For those who have teletypes with programmed answerback wheels, try (201) 279-5956 for Western Union's EYI news service for TWX subscribers. Otherwise enter random garbage after it prints out "WU FYI MAWA" on your terminal. It will give out it's own instructions from there, if you get into it!

If there are any other TWX freaks out there, especially in the DC area, please contact me. I think my P.O. Box is safe, but I don't suggest a return address on the envelope. My answerback is TWX R4 PHREAKS.

Your phriend,
Osbert Kilgallen
P.O. Box 9486
Rochester, NY
USA 14604

Dear TEL,

Here is a tip on how to save money on an unlisted phone. Telco usualy charges NOT to list your telephone on the theory that not doing something somehow costs more than doing it. You can, however, list your phone under any name you choose with your one free listing. For years my phone was listed to Bruce Wayne. My friends knew, and as for others, well my number was better than unlisted, not even the emergency operator could find it.

B.W.
Rough and Ready, CA

Gentlemen,

I am having a friend check the method described by H.S. of Mamaroneck, New York (TEL, Feb. '75) for accuracy. He could be wrong or he could have a freak system or he could have a wide open door—you never can tell!

On WATS lines—in the USA a "2" in the third digit of the exchange (800 - XX2 - XXXX) means that the number is valid for only one state. In Canada the one province code is the second exchange digit, I think it is "5" but I'm not sure.

For Western Electric equivelent equipment try Smith-Gates Corp., Farmington Conn. They make non-Bell equipment to Bell specs or better.

In the area of design, a Read-Only memory could be used to convert a Touch-Tone phone into a MF pad with a 2600 Hz mute tone.

Also, a shift register has the ability to store information and give it out in order, a MF pad with a "memory" is one such application. You might try a Texas Instruments TMS-3123 hex 32 bit shift register.

One further note. On some exchanges you can access the exchange and "walk around" in that exchange by modulating a 2600 Hz tone with a telephone dial and dialing the last four digits of the desired number in that exchange.

I enjoy reading your magazine. Keep up the good work.

X Sawyer
Wisconson, USA.

TEL welcomes letters from readers on all topics of interest, however, we regret that due to the huge volume of mail we cannot answer each letter individually. Letters of general interest will be printed as space allows, but we simply do not have the time to reply to the myriad of requests for technical information that arrive each day. We do, of course, appreciate your comments and try to slant our articles to your interests.

tinued from Page 4)

and and 4 high-band tones as illus- in Figure 1. Pressing a pushbutton s in the generation of two tones, a band and a low-band frequency. ng number 8 (TUV), for instance, s the generation and transmission of 52- and 1336-Hz frequencies. For the ushbuttons corresponding to the 10 in the rotary dial only 10 frequency inations are required. A four by three is adequate, omiting the 1633-Hz ency.

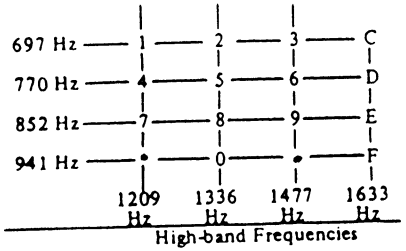
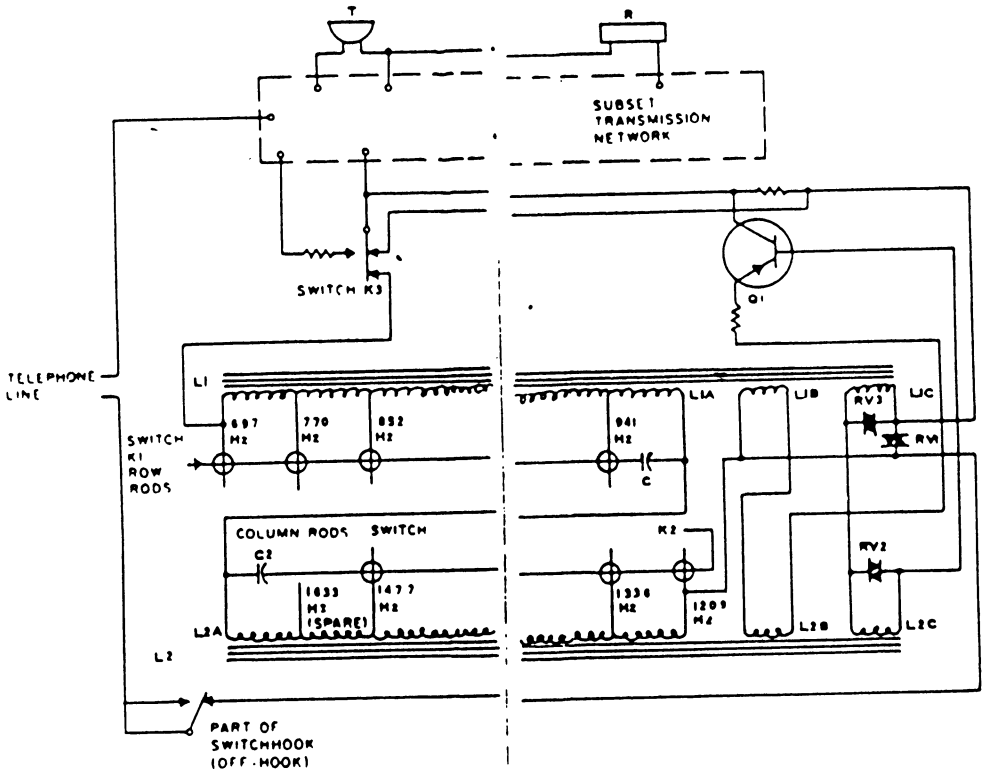


Figure 1. Touch-Tone Frequencies

faceplate of the Touch-Tone set is ned for a capacity of four rows and columns, or 16 possible pushbuttons. ever, three rows and four columns are ently all that is needed for domestic criber use; ten for the digits 1 to 10 two special functions designated by * # which are used primarily for elec- ic switching offices.

design of the Touch-Tone faceplate not a simple task. In studies dating as back as 1955, tests were made on ous pushbutton arrangements—rows, les, triangles, crosses, even one resem- g the layout of the rotary dial. The erent formats were tested for speed r rate and customer preference. Largely cting the decision was the necessity to p letters on the new pushbutton "dial". as felt that any arrangement other than mal reading sequence (left-to-right and -to-bottom) would be confusing. People d to adding machines will most notice difference. It did not seem, however, create problems for persons who used h the telephone and 10 key adding chines. There are now on the market, those few people who demand such, cial calculators with Touch-Tone format yboards.

After design of the Touch-Tone pad the standard telephone was also re-designed to reflect the new square format. In marketing studies conducted by the Bell System 96% of the test subjects felt that Touch-Tone was an improvement.



GENERATION OF TOUCH-TONES

The Bell Touch-Tone telephone sets employ inductor-capacitor (LC) resonant circuits to generate the required tone frequencies. Recent electronic developments have introduced the use of integrated circuits reducing the 15 components in the inductor-capacitor network to six. In fact, Motorola and Mostek now produce IC chips which need only a keyboard and power source to produce all 16 tones. One reason why the Bell system uses the outdated LC system is that it cannot be retuned to the MF frequencies. But even that would be almost impossible because of the design of the Touch-Tone matrix. The tone pairs for the MF system, if diagrammed out, will give a triangular matrix, with some tones on both the vertical and horizontal axes. The Touch-Tone system, however, uses tones exclusive to either of the two axes, but not on both, resulting in a box matrix.

In the Bell LC system, pressing a pushbutton causes the rotation of two rods. One rod is associated with a row of pushbuttons, the other with a column. The pushbutton that is pressed determines which of a pair of rods will be rotated, resulting in the generation of two audio tones.

In Figure 2, a 500-type telephone unit is shown, equipped for Touch-Tone dialing with the frequency generating unit which includes two tuned circuits. Each circuit consists of an inductance coil (toroid transformer) of the *ferrite cup core* type, which has three windings and a capacitor. The windings are designated L1A, L1B, L1C and L2A, L2B, L2C, for the two inductors. Capacitor C1 is associated with inductor L1A and C2 is associated with L2A. Taps on the coil L1A are connected to the four rods linked with the rows of pushbuttons. The tuned circuit of L1A and C1 controls the generation of the low-band frequencies. Similarly, the taps on L2A and C2 form the tuned circuit to produce the high-band range of frequencies.

The operation of any pushbutton activates sets of contacts on switches K1, K2, and K3. One set of contacts on K1 is connected with each rod of the rows of pushbuttons. The contacts of K2 connect to the rods linked with the columns. K3 is common to all pushbuttons and is activated only during the later part of the sequence of events. In the normal position of K3, most of the current drawn by the transmitter T, will flow through RV1. Some current will also pass through L1A and L2A.

Assume that pushbutton 2 (ABC) has been pressed. The rod linked with the first row will close the contacts of K1. At the same time, the rod of the second column will close the contacts of K2. Activation of the contacts of K1 connects C1 to the first tap on L1A. Similarly, the operation of K2 connects C2 to the second tap on L2A, establishing the tuned or resonant circuits for producing the 697- and 1336-Hz frequencies. These frequencies correspond to the pressed digit 2 (ABC) but the tone signals have not yet been generated by the action of K3.

Not until the pushbutton is pressed all the way down does K3 operate, interupting the direct current flowing through L1A

(Continued on Page 15)

MEMPHIS— Larry Manning has been convicted of cheating the phone company of $1.86 in long-distance toll charges. Manning, a former South Central Bell employee, was sentenced by Federal Judge Robert McRae Jr.

"It may seem trivial to him", the judge noted, "but I think he still doesn't realize there was anything wrong with cheating the telephone company". Manning said he would appeal the two-year prison term.

ıtinued from Page 14)

pressed digit 2 (ABC) but the tone als have not yet been generated by the ɔn of K3.

until the pushbutton is pressed all the down does K3 operate, interrupting direct current flowing through L1A L2A, causing shock excitation of the tuned circuits, and thereby generating 697- and 1336-Hz frequencies. At the same instant, the central office bat- on the subscribers line will be con- ted to transistor Q1, sustaining the 697- 1336-Hz oscillations. The speech cir- in the telephone set will be shunted by action of K3, but the subscriber will be to hear the outgoing tone signal. ıes are not always heard by the sub- ber. In Europe, for example, there is audible output while dialing.

ɔme people are bothered by the use of a gle transistor to generate two audio quencies, so the lower tone can be ısidered the frequency of oscillation ile the high tone is called a parasitic illation, for the purposes of explain- on.)

ditional equipment is needed at the ıtral office for handling the Touch-Tone nals. Two principal types of receivers ve been developed for use in existing ctro-mechanical offices. One converts tone signals into direct-current dial lses, and the other signal detector trans- es the tone signals into a form which can used by the common-control switching uipment. The Touch-Tone receiver and apter units in central offices are designed handle both rotary dial and Touch-Tone lephone sets.

USING TOUCH-TONE

cause Touch-Tone signals can be trans- tted over any audio, carrier, or radio cir- it, many persons—including radio am- eurs—have adopted the system for con- ɔl of various devices, such as FM remote- se stations and repeaters.

ecause two tones are used for each func- on in the Touch-Tone system, reliability excellent even when used on radio cir- uits that are noisy or fading. Another that as made Touch-Tone popular with some adio users is that many use *autopatch* onnections to the public telephone network. By simply ordering a Touch-Tone line for the autopatch, the same encoders and decoders can be for both phone patch and repeater control.

For such applications it is necessary to have a Touch-Tone pad that is portable, i.e. not tied to your telephone. The pad from your telephone can be removed and used away from your phone. (Warning: Do not tamper with any instrument belonging to your local phone company.) The connections for Touch-Tone pads manufactured by Western Electric and Automatic Electric are shown in Figure 3. These Touch-Tone pads will work with as little as nine volts or as much as 24 volts DC applied. Either a high- or low-impedance output may be employed, as shown in Figs. 3 C and D.

Touch-Tone also has the advantage, due to it's audio characteristic, of being recordable. This use lends itself to autodialers and remote dialers. And, for those musically inclined, the Touch-Tone pad is a miniature electronic organ.

To get even more out of your Touch-Tone phone read the accompanying article for directions on how to add the 1633-Hz column to your present phone. □

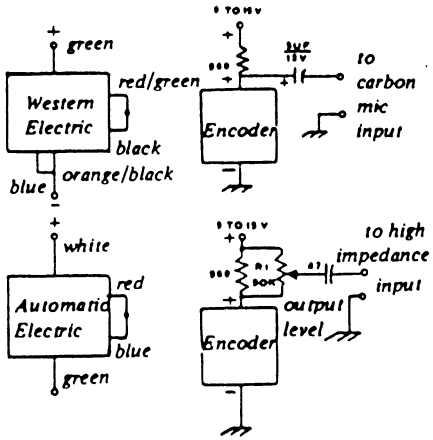


Figure 3: Typical connections for the encoders manufactured by Western Electric (A) and Automatic Electric (B). If low-impedance output is needed to drive a carbon microphone input, the circuit at C can be employed for either encoder. Likewise, the circuit at D will provide a high-impedance output. R1 can be any miniture composition control; the types made for mounting on circuit boards are ideal.

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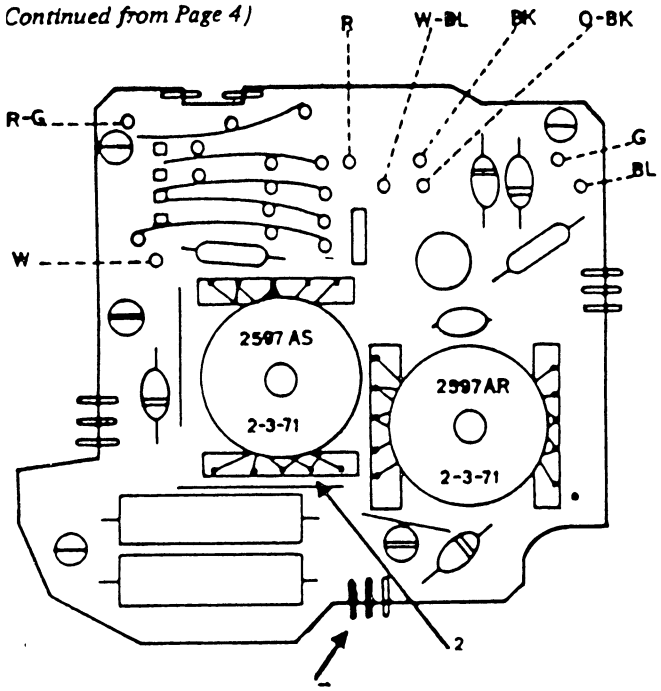


Figure 2: This drawing of a Western Electric 35 Y 3A Touch-Tone pad shows the terminal on the toroid transformer (1) and the connector (2) for modification of the pad.

The terminals indicated by letters represent the wire connections. Where only one letter is shown, the wire is solid color. 2 letters indicate that the wire is multi-colored. The first color is the basic color and the 2nd is the stripe color. R-red, W-white, G-green, O-orange, BK-black, BL-blue.

erminals at the base of the transformer. ocate the solder terminal strip closest to he bottom of the pad. It should be across rom one or two yellow capacitors de- ending upon the specific model of your ad). Find the 4th terminal from the left. his terminal is the tap-off for the 1633Hz one. Take another piece of one-foot wire nd strip off about 1/8th of an inch. Solder ne end of this wire to the 4th terminal n the toroid transformer. Make sure it is a ood clean connection and not touching ny other terminal. Take the three wires nd run them through the hole in the lastic protector with the other wires lready coming from the Touch-Tone pad.

epalce all the plastic protectors. There hould be one for the toroid transformer nd two for the Touch-Tone pad. When all he protectors are replaced, put the Touch- one pad back in position on it's support racket and screw it in place.

he switch may be installed anywhere but ve recommend the following location. ook on the underside of the telephone's over and find the two plastic hang-up pegs. Between them and about one-inch down, there should be a metal screw. Unscrew this screw and remove the plastic part. Be careful not to lose the screw, the part, or the two plastic hang-up pegs which will now come out with the absence of the plastic part. In the middle of the part drill a hole the right size for your particular toggle switch. Install the switch and put it in so that it will flip left to right. Now take the wire that you soldered to the tap on the toroid transformer for the 1633Hz tone and solder it to the left terminal on the toggle switch. Now take the two wires that were twisted together and untwist them. Take the wire that went to the outside terminal (that you created by separating the two pieces of joined metal) and solder on to the middle terminal on the toggle switch. Put the two plastic hang-up pegs (the part that now has the switch on it) and the screw back in place. Put the cover back on the phone. When you do this, be sure that the wires you replaced are under the hang-up switch. If they are on the top of the hang-up switch they will hinder its operation.

If you carefully followed the above directions, this is how your modified Touch-Tone pad will work: when the switch is thrown to the left your telephone is in normal Touch-Tone operation. When the switch is thrown to the right the last four numbers on the touch tone pad will be converted to your four numbers. What happens is that the four low tones, 697, 770, 852, and 941 will be paired with the 1633 Hz tone instead of the normal 1477Hz tone. When the switch is thrown to the normal position, it switches between taps on the toroid transformer. The reason that this circuit works is based upon the Bell Systems method of production. The basic Touch-Tone pad consists of a 4x4 matrix (see fig. 2), while the normal phone is equipped with a 3x4 matrix. In order to save money, the Bell System uses the same toroid transformer in both pads.

	1209	1336	1477	1633
697	1	2	3	FO
770	4	5	6	F
852	7	8	9	I
941	*	O	#	P

Always be sure that the switch is in the normal position when the four new numbers are not needed. If you leave the switch thrown to the right and forget about it, when you try to dial a number in the last row it will not be the proper digit signaling tone. If you forget and use the 1633 Hz tone instead of the 1477Hz tone you will probably get what appears to be a busy signal. If this happens enough you might receive a call from the phone company asking if anything is wrong with your phone. They may even send out a repairman to check the phone.

Sometimes, one may see a phone man pull up and not wish to see him for one reason or another. If someone under 18 goes to the door and says that no-one else is home, phone company regulations prohibit phone men from entering a dwelling under these circumstances. The repairman will go away—never to return. The phone company, most likely, will never send out another repairman. □

A LITTLE LEXICON

(A Continuing Feature from TEL)

Cable: A collection of telephone wires in a protective covering. Cables may contain up to hundreds of pairs of such wires.

Central Office (CO): A building where customers' telephone lines end and where those lines are interconnected with each other.

Dial Tone: An electrically generated sound which is heard when the telephone handset is removed from it's hook. It signifies that automatic switching equipment is ready to receive dialed numbers. Dial tone is generally a mix of two frequencies, 350 and 440 Hz.

Director: A device used in transmitting long-distance calls. It receives impulses from numbers dialed and activates other units of equipment which provide a route for a call to follow.

Distributing frame: The structure in the central office where customers' wires are joined with other wires so that cross-connections can be made.

Dropline: Paired insulated wire which leads from a customers' house to the nearest telephone pole or underground cable outlet.

Linefinder switch: The first switch in the step-by-step dial system used for connecting one telephone with another.

Pair: The two wires of a telephone line which handle various electrical impulses including dialing, ringing, and communications.

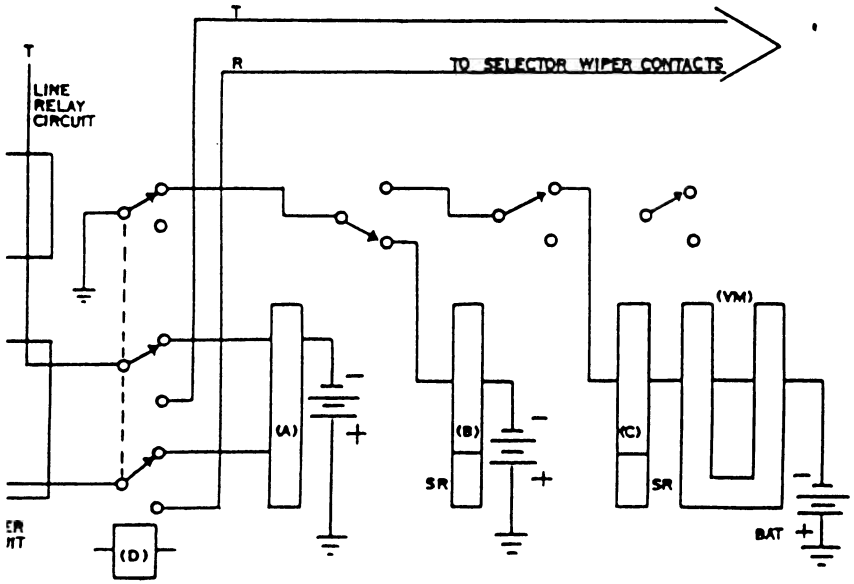
Test board: Equipment used for making tests of customer lines to aid in determining the cause of service breakdowns.

Terminal Box: The container, frequently on poles, where customer drop lines are connected. From this box, connections are made to lines in a cable. □

tinued from Page 5)

dialing the fifth digit you are con- to an item of equipment called the :ctor, or *final selector*. Again, there n steps up and ten accross. The sixth eventh digits are both dialed on the selector. The wiper of the final selec- eps up to a level corresponding to the dialed. Say, for example, the sixth is a three and the seventh digit is a . The wiper of the connector steps up e third level and rotates accross to the th contact. Thus, one connector takes of the last two numbers dialed. It also to control all of the line relay recep- tion functions such as ringing and super- vision (supervision is used in signalling over inter-office trunks to indicate that the called party has answered).

In a step-by-step office, all the equipment —the line finder, the selectors, and the con- nector—are in use until the calling party hangs up. This is called *direct control switching*. With direct control switching there is always the possibility of all the equipment being in use at once, therby leaving some customers without service for periods of time. This problem is most severe in the early evening and is called a lock-out chain. □



Central office battery (48 volts)
side of line
g side of line
enotes slow release relay
ertical magnet of selector
), (C), AND (D) - Relays in the first selector circuit. Relays (A), (B), and (C), are operated during make interval of dial pulse

A) is held energized over the subscriber loop through the normally closed contacts of the dial. B) is a slow release (SR) type having a copper sleeve around the end of its core. Therefore, A) momentarily releases during the first break interval of the dial pulse, the current induced in per sleeve of (B) will keep it energized. At the same time that (A) momentarily releases, (C) vertical magnet (VM) of the selector will operate. Relay (C) is in series with the vertical mag- t both operate through the back contact of relay (A), during its initial release interval. The (C) also slow release and will remain operated during the make intervals of the dial pulses of each The vertical magnet raises the selector mechanism vertically in step with the break interval of ial pulse. At the completion of the pulses, relay (C) will release because of the longer make l between digits. This pause is due to the time required to pull the dial to the next numeral. The of (C) allows the selector circuit to advance and initiate rotary motion in order to find an idle r trunk. When this action has occured, relay (D) will operate, cutting through the circuit to the ding selector in the switch train.

(Continued from Page 6)

given the probation officer's report. She was visably pleased and told my attorney that the only thing wrong was that she had considerably more time in jail figured for me. (The report had reccomended 5 days.) So I ended up with a fine of $375; six days in jail (to be served on weekends); six months probation *and* restitution to Ma Bell in the amount of $145.27. Last of all I had to promise never to indulge in such activity again.

One interesting fact came out during this affair. My attorney and a friend of mine went to examine the phone company's evidence. Part of this was in the form of computer print-outs and revealed that in addition to my apartment, 12 others in our building had also been tapped. (A fact that is now denied, and probably erased from the computer in any case.) The purpose of the multiple taps is to see if you are, perhaps, using someone else's line to commit illegal acts.

In trying to analyze why we got caught, I can only tell a story of my own stupidity. First of all, we had an unlisted number for years and never had trouble. It wasn't untill my wife listed the phone in order to take her company discount that we stood out like a red flag. Ma Bell was checking up on the numbers we were calling. Second, we got careless with the passing time, to the point of using names while calling. Third, some of my wifes calls were to Finland (where she comes from) and lasted in excess of an hour, which of course sounds the gong when they start checking for 800 numbers. And finally we were damned fools for calling from home at all! Once or twice a month, in an emergency, for 5 minutes or so probably would have been allright, but with modern detection equipment anything from home is really foolish.

I am now a little wiser, and out of the phone phreak business. I am still fascinated by the phone company, perhaps more than ever as a result of what has happened. I now collect what information I can on phreaking and the law. Take my advice, if you want to play with Ma Bell, get to know her first. □

(Continued from Page 8)

total test registrations and the test calls for each loading division.

B. Investigate any deviation between actual and expected which exceeds three percent.

First, re-compute the expected registration for the hour being investigated using the actual delays encountered. (As opposed to the average.)

If actual differs from expected as re-computed, perform a stop watch timing to determine if trouble is calibration or registers.

(Continued next issue)

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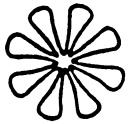

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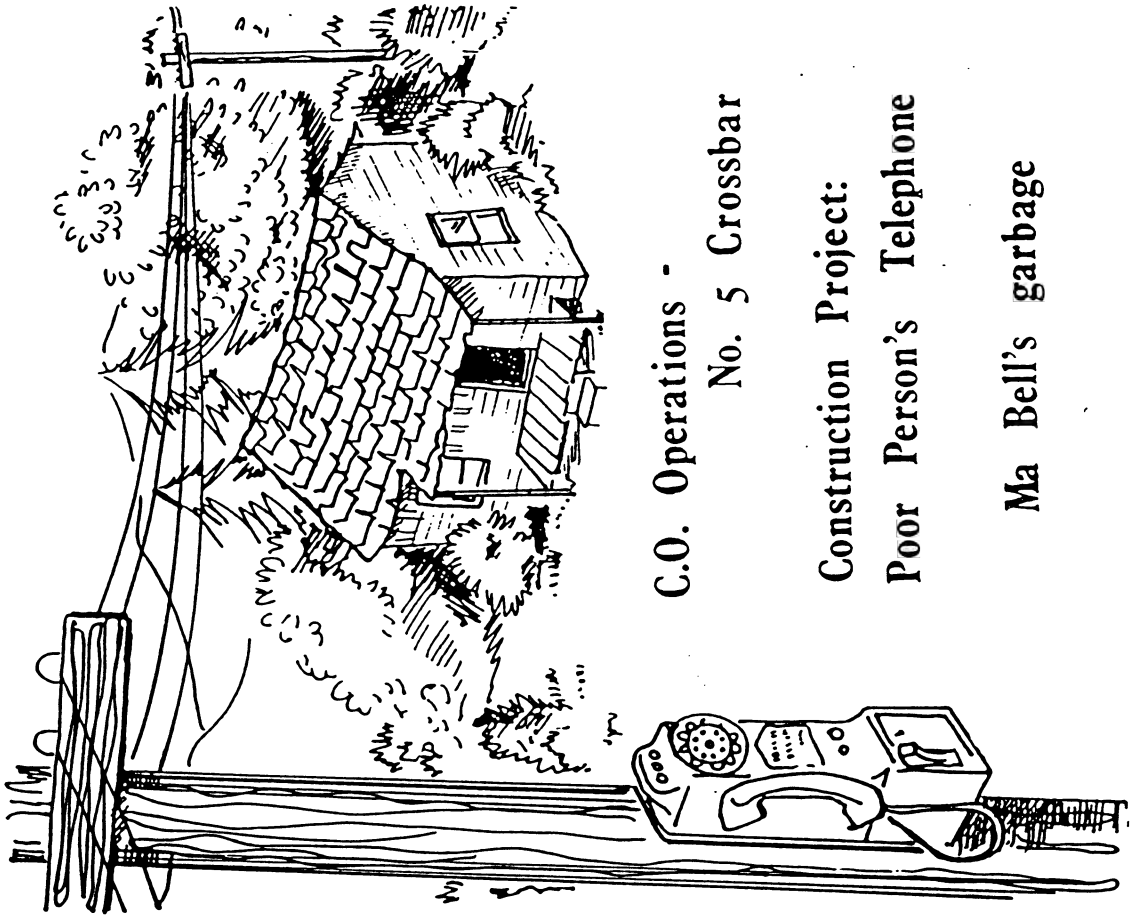

C.O. Operations - No. 5 Crossbar

Construction Project: Poor Person's Telephone

Ma Bell's garbage

Telephone Electronics Line

TELEPHONE ELECTRONICS LINE

19730 Ventura Blvd. Suite 3

Woodland Hills 91364 US

TEL SYSTEM

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Editorial

By Jack Kranyak

An interesting development awakened us here at TEL recently. On an otherwise quiet Saturday one of our writers called home to let his wife know he would be a little late. To his suprise, the call was answered by an intercept operator, who told him that number had been disconnected at customer's request. You can imagine his shock, especially since he hadn't spoken to the phone company since the day his phone had been installed. A call to the operator verified the intercept operator, but the operator could do nothing and suggested a call to repair service. Repair service declined assistance, since, as they saw it, nothing was broken. They in turn advised that the only possibility was to wait out the weekend and call the business office on Monday to get a reconnect order. After further badgering the repair operator stated flatly that there was "no way in the world" to get the phone back on during the weekend. Our correspondent inquired if Richard Nixon or perhaps Elizabeth Taylor would also find it impossible to get service on a weekend. "Yes" came the reply After that it only took two supervising operators, the manager at the local service center and five hours to restore service.

A lesser person than our intrepid reporter might have conceded early in the game and spent the weekend without telesatisfaction, but other than musing about how it might have been, we more or less forgot about it. But not for long! Only one week later the same thing happened to our business lines here at TEL. A little thought and investigation led us to the conclusion that some unhappy reader had found out the name under which our service was listed, and using that name had called in a disconnect order. A call to our business office proved even more interesting. The business representative remembered taking the disconnect order. She said the caller, who had a noticable scottish accent, had identified herself.. "Herself"? we asked! "Well, yes" said the business rep "I thought it was a little strange, but she insisted she was Jack Kranyak, so I took her order."

That situation is deplorable, but even worse were the phone company's (in this case Pacific Bell) reasons for not wanting to turn the service back on during a weekend. They argued that there was no way [unless we spoke to the business office, closed of course] they could be sure that the person requesting the reconnect was the subscriber. Their point being that if they turn on your phone when it should be off someone might make an unauthorized long-distance call, a very serious condition in their eyes. As to our contention that is was much worse to leave someone who wanted service without it, they had no reply from their world on the other side of the looking glass.

"So" you ask, "what is the point of all this?" Well, simply to help you protect yourself from the same kind of harassment. After some prodding our business office agreed to the use of a code word to authorize further orders. We could have required that a call be made to our number to verify, but then we wouldn't have been able to call the business office from another location.

TEL suggests that you set up some sort of similar system with your business office. According to the business representative this type of occurance is not all that rare today. But further, we think that a company which does most of it's business vocally should require some identifying code, such as a mother's maiden name. This would be noted when service is first ordered and checked before any information would be given out or an order taken. This is common practice at banks; we think it's time the phone company caught up [ ]

e Phone Company will go to extremes occasions. In fact, unless you really ow what to expect from them they will prise the heck out of you with their "unblished tariffs".

'cently, a situation was brought to my ıention that up till then I had been totly unaware of, least to mention, had any ncern about. It involved garbage!

ıe Phone Company will go as far as to osecute anyone who rumages through eir garbage and helps himself to some. Of ırse they have their reasons for this, and) doubt benefit from such action. But, ıy should they be so picky about garbage? ıe answer soon became clear to me: ose huge metal bins are filled up with ore than waste, old ıod and refuse...

lthough it is Pacific elephone policy to cycle paper waste 'oducts, sometimes nployees do overlook ıis sacred operation hen sorting the garıge. Thus top-secret ınfidential Phone ompany records go to ıe garbage bins inead of to the paper ıredders. Since it is ınstantly being upıted with "Company emorandums" and ıpplied with extensive 'ference material, the ıone Company must ıntinualy dispose of the outdated ıls. Some phone companies are supplied ıch year with the complete "System Pracces" guide. This publication is an over 40 ıot long library of reference material ıout everything to do with telephones. As ıe new edition arrives each year the old ersion of "System Practices" must also be ırown out.

very quickly figured out where some local hone phreaks were getting their material. hey crawl into the garbage bins and reıove selected items that are of particular ıterest to them and their fellow phreaks. uch information is copied and distributed o "trusted friends".

One Phone Phreak in the Los Angeles area has salvaged the complete 1972 edition of "Bell System Practices". It is so large and was so out of order (the binders had been removed) that it took him over a year to sort it out and create enough shelving for it in his garage.

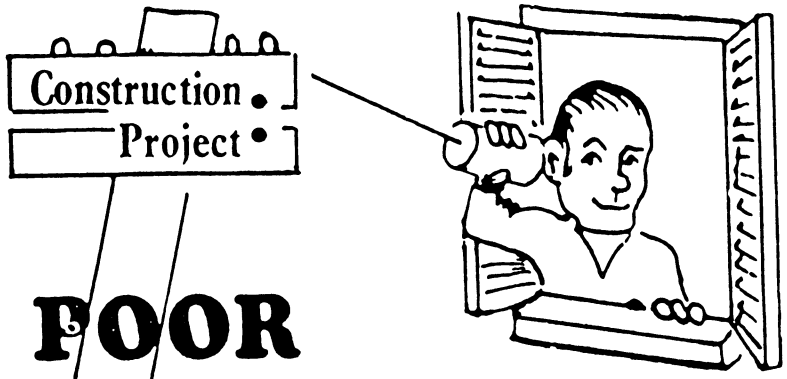
Much of this "top secret" information is so secret that most phone companies have no idea what is in their files. They have their hands full simply replacing everything each time a change in wording requires a new revision. It seems they waste more paper than they can read!

It took quite a while for a Hollywood Cal. traffic manager to figure out how all of the local phone phreaks constantly discovered the switchroom test numbers. Whenever someone wanted to use the testboard they found local phone phreaks on the lines talking to points all over the world. It got to the point where the local garbage buffs knew more about the office operations than the employees themselves. One phreak went so far as to call in and tell a switchman what his next daily assignment would be. This, however, proved too much. The switchman traced the call and one phone phreak was denied the tool of his trade.

In another rather humorous incident, a fellow phreak was rumaging through the trash bin when he heard someone aproaching. He pressed up against the side of the bin and silently waited for the goodies to come. You can imagine his suprise when the garbage from the lunchroom landed on his head.

Most people find evenings best for checking out their local telco trash piles. The only thing necessary is a flashlight and, in the case mentioned above, possibly a rain coat. A word of warning though, before

(Continued on Page 20)



POOR PERSON'S PHONE

by A. MILLS

(EDITOR'S NOTE: The following article was contributed by a TEL reader. We wish to emphasize that parts for the "Poor Person's Phone" should NOT be removed from any equipment belonging to the telephone company! Local electronic supply stores or large mail order firms (Allied, Radio Shack etc.) carry a large variety of telephone gear. Further, before connecting your own "Poor Person's Phone" to the telephone lines be sure to consult your local telephone business office as to relevent regulations in your area.)

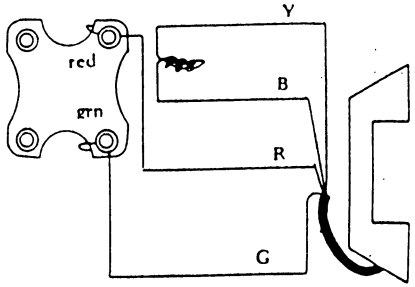
The telephone described in this article is not very sophisticated, but it does work. And while it is not something you might want in your living room, it is a cheap way to put a phone in the attic or basement, or wherever you might want to answer the phone.

The main part of this phone, and the hardest to make, is the handset (mouthpiece and earpiece). Rather than build this piece yourself it is best to procur it from an outside source. I wouldn't want to suggest that you go out and cut one out of a pay phone, but people have been known to do this. The metal sheathing around most pay phone cords makes that quite difficult nowadays anyway. Handsets are also available, commercially, at much less risk but slightly higher cost.

Having found a handset we move on to the construction of the phone itself. The cord from the handset contains four wires. In the case of the phone mentioned in this article the two wires coming from the earpiece are yellow and black, while those coming from the mouthpiece are green and yellow. In many phones the earpiece wires are red and black, and the mouthpiece wires are both white.

First connect the red and yellow wires together, then connect theblack and yellow wires to your phone line (see diagram 1). The phone line wires will normally be red and green.

diagram 1



(Continued on Page 13)

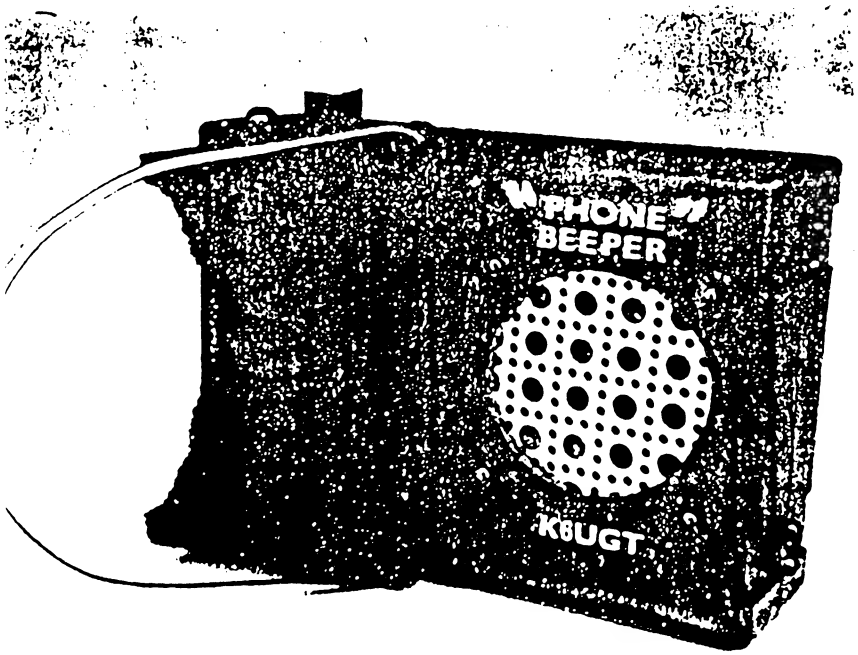
:RED BLECHMAN

ɔrding telephone conversations has be- : very commonplace in recent years. is due, in part, to the introduction of ɔensive battery operated tape recorders, the availability of simple inductive re- ing pick-ups. However, in most states ɹse of this recording in public (i.e. in t or a radio broadcast) is illegal un- an audible "beep" is heard on the ıe every 15 seconds. The purpose is to 'm the caller that the call is being re- ed. More sophisticated direct coupled rders usually have a "beep" tone built in, but providing the tone becomes a problem when using an inductive pick-up device. The "phone beeper" described here serves this purpose conveniently and efficiently, requiring no additional wiring connections to the telephone, and only costs about $10 to build.

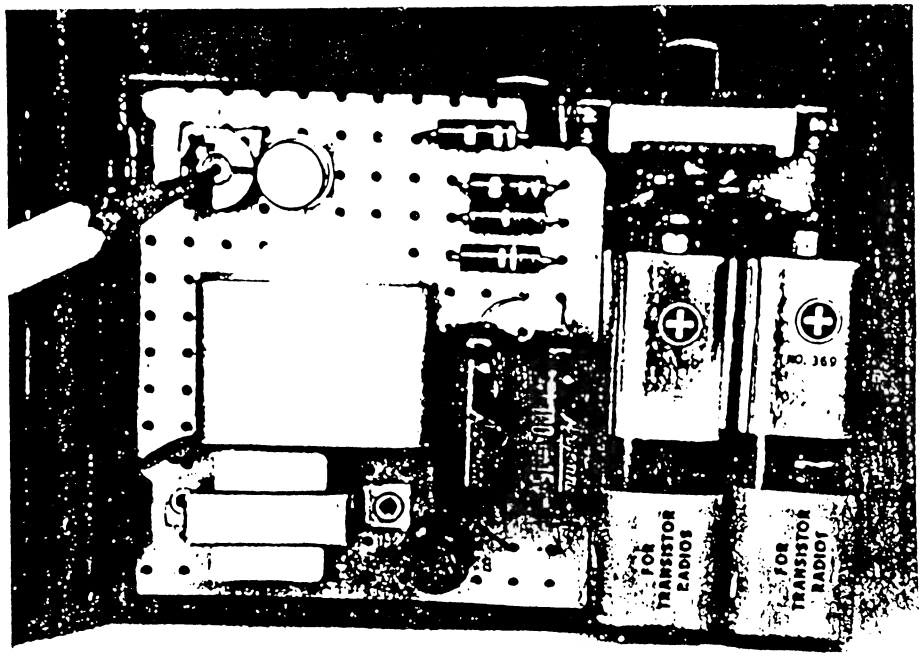
The "phone beeper" operates in a simple manner. The miniture speaker output of the "beeper" is placed near the telephone mouthpiece; the "beep" is therefore carried to the other end of the line with normal conversational volume. At the same time the "beep" is coupled through the

ɔnstruction Project

telephone beeper



: AUTHOR'S COMPLETED "PHONE BEEPER" This simple device could save you ı a lot of legal headaches. The "beep" sound is emitted by the speaker (behind the ninum grill) at 15 second intervals. The unit, completly portable, is held in place by a · loop and foam cushion. The whole project can be built in one easy evening for less ı $10.



The parts layout is not critical, the author's unit was assembled in a plastic box. A sub-miniature pot allows feedback adjustment for oscillation of tranistor Q2.

telephone sidetone generator, to the recording pick-up on the earpiece, and recorded at subdued volume. Furthermore, the "audible "beep" every 15 seconds, even after the phone is back on it's cradle, reminds the user to shut off the unit!

Figure 1 shows how the "phone beeper" is used. Notice that it is entirely independent physically and electrically from the recording pick-up at the earpiece. A self contained unit, the "phone beeper" contains a timing circuit, osscillator and speaker, and uses two common 9 volt transistor radio batteries for power. Built into a small box which may be held to the mouthpiece with a retaining clip made from piano wire, it does not interfere with normal telephone operation.

Figure 2 shows the schematic, and the simple circuitry used to time the "beeps" Q1 is a unijunction transistor (UJT), which is energized by the two 9 volt batteries in series. When the switch is closed the two large value capacitors (C1 and C2) are charged through time-constant resistor R1. When the voltage at the emmiter of Q1 reaches a critical value, C1 and C2 discharge through the emitter base 1 junction of Q1, thus providing conductive bias for oscillator transistor Q2.

Feedback for oscillation is obtained through the center tapped transformer, which also couples the oscillator to the speaker. Variable resistor R2 controls the oscillation frequency. Q2 may be just about any inexpensive PNP transistor, with the adjustment of R2 compensating for differences between specific transistors. The time interval is controlled by the relationship between C1, C2 and R1 in conjunction with Q1; increase the resistance of R1 if the interval is too short, decrease if too long. If "chirp" is evident, readjust R2.

(Continued on Page 18)

ENTRAL OFFICE OPERATIONS :

part two no. 5 crossbar

by DAVID AUTOVON

step-by-step switching office (see TEL '75) serves its purpose well for small ly knit groups where automatic calling ed only over short distances or for within one central exchange. With advent of Direct Distance Dialing, ever, equipment became more complex. he same time, the need to switch more faster, without extreme expense be- more apparent. It was for this pur- that Crossbar Switching was develop- There are a number of different types rossbar switching systems. The basic sbar systems are: No. 5 crossbar, No. 1 sbar, and 4A or Tandem crossbar. The in most common use today is the No. ossbar system, commonly refered to ossbar 5. It is this version of crossbar will be discussed in this article.

crossbar systems get their name from basic crossbar switch. This is an electro- hanical inductivly operated device. It omposed of bars, called *tickler rods*, ing its length, both vertically and zontally These are called *verticals* and *zontals* for short Each rod rotates oximately 45 degrees when operated by lay coil at its end. Each tickler rod quiped with many protrusions, called ers, which push against contacts when rod is rotated. When one vertical and horizontal are operated, a pathway for nections is established at the point re the two rods intersect. The ability orm electrical connections in this man- forms the basis of the crossbar system. re are two sizes of crossbar 5 switches monly used; 100 point and 200 point. 100 point has ten verticals and the point switch has 20 verticals. Each has ten horizontals. The size of switch ded in a particular exchange is deter- ed by the traffic volume of that ex- nge.

In the crossbar system equipment falls into two major catagories, *common control equipment*, and *talking path equipment*. Common control systems employ a *one at a time* method of operation. To better understand what is meant by "one at a time", consider the example of the basic single position operator controlled manual switchboard. At such a board the operator shares her time and attention over a number of calls. First she finds the calling line (indicated by a flashing light or other signal). She next determines the number to be called (usually verbally), and finally connects the two parties. After this process is completed the operator then leaves the call or "drops off the line". The operator can set up only one call at a time; when that call is completed she can go on to make another connection. Common control equipment is similarly used in the process of making the call, and also "drops off the line" after completing a connection. Equipment classified as common control includes: (1) the *originating register*, (2) the *marker*, (3) the *sender*, (4) the *incoming register*, and (5) the *number group*.

The other catagory of crossbar equipment, talking path equipment, includes the *switching frames*, the *line link frame*, and the paths (*trunks*) through which the talking circuits are established.

In the central office, each incoming telephone line is connected to a structure called the *main distributing frame* or *main frame*. As in step-by-step offices, the cables from subscribers telephones enter the building through a cable vault. The cables are then brought up to meeting point, from which the individual wires radiate. This meeting point is the main frame. The two wires from each subscriber are called a *pair*, and terminate on the vertical side of the main frame. Wires coming from the crossbar office equipment are terminated on the horizontal side. These wires connect the

(Continued on Page 19)

European Report

battle with the phone phreaks "hots up"

(The following is reprinted from New Scientist, 3 April 1975.)

A new offensive against "phone phreaking" may have claimed its first victim last month. An alleged phone phreak had dialed a motoring organisation after a breakdown in central London, reportedly using a "lucky number" to save the change he didn't have. But, in mid call, his line was abruptly crossed by the Post Office's special phone phreak detectives. (In Britain, as in most other countries, the telephone system is owned by the state and run by the Post Office.)

The lucky number is a code which, dialed in front of a normal call will block the charging pulses from reaching the phone or the phone bill! Interestingly, this particular code had been rigged up inside the Post Office's private London telephone system, which interconnects its numerous large London offices. But, outsiders could use this fiddle by dialing 432, the access code to Post Office headquarters, followed by the "lucky digits", 967, and then dialing the normal number, free of charge.

But the luck of the number ran out that day for unknown to the phreaker, opposite the City [of London] callbox he used was a Post Office building. And, as he called through, the PO detectives were listening in just 100 yards away.

This is not the first such fiddle in locations where only the internal staff could be responsible. Two years ago, the [London] Sunday Times (January 21, 1973, p 1) reported a "Free-phone racket inside the Post Office" and alleged that up to 75 exchanges had been deliberately tampered with. One code which may have been included was very similar to the unlucky London number, using 977 rather than 967. Both these codes worked by using a unique loop-around circuit which by-passes checks in the equipment. Both must be wired by changing normal connections. Although that lucky number disappeared soon after the newspaper report, it reportedly surfaced last Autumn in its new form.

The London telephone area has reputedly now been well immunised against the phreaks, since a large trial was staged by the PO in 1973 (see "Are Telephones Addictive?" New Scientist, vol 60, p 756-760). Startlingly, it is suggested that this fiddle is a new tactic by the PO detectives, who are said to have set it up themselves. One PO engineer who works on this private network is convinced that it was established as "trap". His view is reinforced by a similar event at another black-listed free-phone exchange – Edinburgh.

There, a useful trunk circuit on code 514 which gave unrestricted access to the International Telephone System mysteriously reappeared after an absence of two years. Far from joyfully greeting an old friend, the wary phreaks probed the circuit and found that only one line had been connected up. They suspected that it might also be connected to an inquisitive Post Office ear. It is plausable that the new London fiddle may have been rigged in this way. □

*** BIG MOTHER IS WATCHING ma bell' has her ear to the wall

by J. LOUIS

Bell Telephone System monitored random fashion millions of long-dis- ce calls originating in six U.S. cities secretly tape-recorded parts of at 1,500,000 calls for analysis in New rk.

highly secretive program was designed help combat electronic toll call frauds,

spokesman for the American Telephone Telegraph Co. says he doesn't think company did anything illegal by eaves- pping on a reported 1.5 million long- tance calls between 1965 and 1970 in an ort to stop cheaters.

/e believe what we did was necessary to otect the integrity of our network and to ep people from cheating" said William llane about the voice recording program ich recently came to light.

llane explained the company had been gued by persons using an electronic blue that bypassed AT&T billing systems d cut directly into the switching equip- ent, thereby completing free calls.

would not eleborate on how the box orked.

ullane did say that during the five year riod only about 500 fraudulent calls d been discovered.

don't think we did anything illegal," ullane said, explaining that the policy intercepting pay-dodging calls has een upheld in the courts. Such calls e illegal and since calls are our only operty we have the right to intercept em."

* * *

but only a tiny fraction of the calls listened to and recorded were ever confirmed by the company as being fraudulent.

The cities where calls were monitored were New York, Detroit, Miami, Los Angeles, St. Louis and Newark, N.J.

The monitoring program covered a six year period and is supposed to have ended in the spring of 1970, when those Bell executives involved were warned to purge their files of any reference to the program and to destroy any materials relating to it.

A source with knowledge of the internal operations of the Bell system said that Bell executives who ran the monitoring program believed the company was within its legal rights, but were afraid Bell's image might be damaged if word leaked to the public. "From the begining they analyzed this very carefully," the source stated, "and decided that if it ever were necessary to reveal the existance of this equipment in order to prosecute a toll fraud case, they would simply decline to prosecute."

A good percentage of the tape recordings involved segments of from 30 seconds to 90 seconds from the time a call was first dialed, but in several hundred thousand instances entire conversations were recorded.

The monitoring equipment frequently misread calls as having indications of electronic toll fraud. Certain frequency components in human speech, for example, could have caused the equipment to be activated as if fraud were involved, with the result that the entire conversation might be taped, it was said.

The program was unknown to many high-ranking Bell executives even in areas where it was in effect.

More than 30,000,000 long distance calls were monitored during the first four years of the program by sophisticated equipment that scanned trunk-line calls. The equipment looked for electrical indications that an attempt was being made to bypass the system's toll charge mechanism.

Of the more than 1½ million long-distance calls that were at least partly recorded during the first four years of the program, with the tapes being sent to New York for analysis, fewer than 25,000 were considered by those doing the analysis to be indicative of fraud.

Of these 25 thousand calls, only about 500, or .016%, were confirmed as fraudulent.

Initially, the program went into effect in late 1964 with six units, each capable of monitoring 100 trunk lines. Each unit could handle about five calls at any given moment. The program began with two units each in New York and Los Angeles and single units in Miami and Detroit. Early in 1967 the Detroit unit was transfered to St. Louis, remaining there untill the spring of 1970, and the supposed end of the program.

Several factors, including fear of public exposure, figured in the decision to end the program. Other factors included concern over the condition of the monitoring units and whether the whole approach was effecient and comprehensive enough.

The monitoring units used during the program were designed by Bell Laboratories to detect electronic toll cheaters, particularly those persons who utilized "blue boxes" and so-called "mutes".

(A blue box is, of course, a device intended to allow the user to place long-distance calls for free, or at greatly reduced rates. It can also access various pieces of specialized telephone equipment not intended for subscriber use. The mute is a device which enables a phone subscriber to answer long-distance calls with no charge to the caller. This device is particularly upseting to Bell, since it can be built in a matter of minutes, with as little as one resistor and two pieces of wire.)

A repairman for the Bell Telephone System has brought suit against the company in Houston, Texas, charging that his constitutional rights were violated when the company sought to search his home without a search warrant for unauthorized telephone extensions.

The pending case raises large questions of public policy both for the Bell System and its customers.

At stake for "Ma" Bell and her many AT&T subsidiaries is the fate of a two year old "Tariff Enforcement Program" which, through electronic monitoring mostly at night, uncovered 155,000 unauthorized extension phones in 1974 alone. Bell System officials estimate their losses in connection fees and billing rates at close to $3 million for that number of phones.

Moreover, the sale of non-Bell phones and other unauthorized non-Bell-built equipment easily installable without company knowledge is a becoming a mushrooming business.

For customers, the case could uphold the right of any citizen to be free from the threat of a house search by the phone company without a warrant.

Bell spokespersons insist they never enter homes without permission although they claim the right to inspect their own equipment "within reasonable hours and with reasonable notice."

This interpretation is based on a decision made six years ago by the FCC which held that phone users do not have to consult the phone company—nor pay for—devices they install themselves which do not require wiring. Presumably, therefore, anything involving electrical connections is illegal.

* * *

(Continued on Page 17)

TTERS

· Sirs:
would just like to mention that I k you made some typos that cause some misunderstandings. page 12 of TEL, March '75, you listed several overseas senders ng. I think the list should read:

acksonville	185
akland	186
enver	187

ittsburgh, which you omitted, ld be 184.
therwise, a good issue, hope you h up soon.

A. Mills
B.C., Canada

Mills is right, we weren't: ED)

r TEL People,
n page 11 of the March issue, nd column, about the middle, pulses are described. "Each inption causes a capacitor to build a small charge..." I am probably ittle out of date on various dial tral offices, but your description ainly doesn't fit any of the old s, and I am really rather inclined doubt that it fits any other dial tem. Someone is rather mistaken ut this, and I believe it is your hor.
Sincerely,

W.W.D
Wichita, KS

W.D. is of course right, it wasn't our rth, ED)

---

the article, "Touch-Tone– what it is, it it does" credit should have been given David Talley and Hayden Book Comy, of Rochelle Park NJ, for material d from "Basic Telephone Switching tems", a Hayden publication.
Tel thanks Hayden books for permission use their material, and recommends ir books on the the field of telephony hly.
The April 1975 issue should have been led Volume 2, Number 4.

COMING NEXT MONTH

OVERSEAS DIALING: SYSTEM 4

TOLL FRAUD DETECTION DEVICES

CONSTRUCTION PROJECT: TELEPHONE JOKELINE

A LETTER TO OUR READERS

Since its inception almost a year ago, TEL has been providing a service not available anywhere else. Advertised as "bringing you the secrets of your phone" TEL has tried hard to print a magazine that fills the needs of all people who have an interest in their phone and the system behind it.

As has been pointed out (TEL March '75) we didn't expect the large response to our new magazine. That initial rush simply caught us off guard. As a result we began to fall behind in production. The March issue didn't appear until late May. It was in May, however, that we moved to larger quarters and added three people to our staff in an effort to catch up.

Within two weeks after mailing the March issue we had finished the rough lay out and were ready to set the April issue. It was then that we were struck an awful blow.

After working till 2 A.M., Jack Kranyak, our Publishing Director and the brains behind TEL, was on his way home, a trip he has yet to complete. Only five blocks from our office he was involved in a seroius auto accident. He lay unconcious for six weeks with severe head injuries.

Fortunately, Jack was strong and has made good progress toward recovery since regaining conciousness. He is, however, still in the hospital.

Jack's accident forced some unexpected changes on us. Two people had to be found and trained to take over the functions that Jack did by himself. Even with the extra help it still took a while to learn in a few weeks what Jack had taken years to put together.

We are now, once again, on top of it, our staff works smoothly and we expect Jack back this fall. We hope we have your understanding and your patience as we work to catch up.

In order to keep all subscriptions in order we decided not to skip months, that is why you are receiving this May issue in September. This is not a old issue! We hope that at our current pace we will be "on time" by Christmas.

Those who wish may write Jack Kranyak c/o Northridge Hospital, 18300 Roscoe Blvd., Northridge CA 91324, Room 102.

Thank you for supporting us to this point.

Sincerely,
John Reynolds

Dear Sirs,
For your info: Several step-by-step exchanges in Alabama have a good assortment of control functions and test numbers accessed by 86XX. Examples: In Birmingham 866 breaks the loop loose from the line finder and shorts the CO end for approx. 2 min. I assume this is to allow loop resistance measurements from the customer premises.

865 gives a second dial tone, when more digits are dialed the dial tone is broken and the equipment seems to be accepting the digits, but you never seem to get anywhere. 781195 is a 1KHz test tone with battery reverse every ten seconds.

The entire 681 exchange will accept Touch-Tone whether you pay extra for it or not! Odd things happen when you address this exchange from 550-XXXX.

Hope you find all this interesting,
R.C.
Birmingham, AL

Dear Phreaks,
Rochester, NY has an independent telephone company which is as bad as Ma Bell. The service is inferior even compared with other independents around the nation.

Anyway here are some codes that I have learned:

Dial 511, and a computer will read back the number you are talking from, followed by a tone.

997-XXXX gets a 1KHz tone, and if someone else in the system dials 998-XXXX the two parties will be connected. I have asked several phone company employes about this and none know what it is for.

The ring back numbers are, 981, 982 or 983 plus the last four digits of your telephone number. In Buffalo the numbers are 571, 572 or 573, I think they work the same way.

Looking forward to the next issue,
AS
Rochester, NY

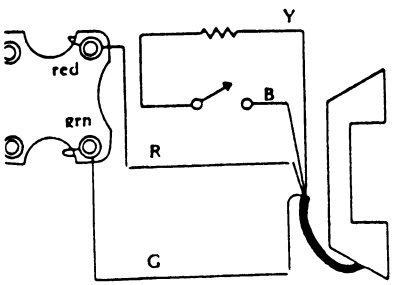
›r phone

tinued from Page 4)

ıote of caution, while phone lines enerally not dangerous to handle, they :onduct very high voltages during the cycle. To avoid the possibility of e electrical shock, remove a phone the hook to "busy out" your line prevent ringing.)

is about the simplest phone that one build. However, I think that even a ›r man" would like a little more so- tication in his telephone. It would, for ınce, be convenient to be able to "hang your phone. In order to do this, install ngle-pole single-throw (SPST) switch veen the yellow and red wires. While are doing this, it would be a good idea ıstall a 1 K ohm resistor (see diagram 2) ·ries with the switch. This will give you uder dial tone. (Smaller value resistors fine, but any greater value stops the tone.)

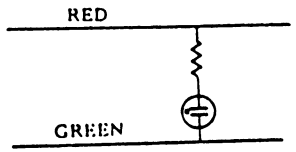
diagram 2



w you can hang up and answer your ›ne using the switch. (By the way most y telephones had a similar switch in- ıd of today's cradle switch.) After get- ; a dial tone, flick the switch *on* and *off* y quickly once. That will "dial" you a :, twice a two, etc. You should flick switch at the rate of about ten times second. It may sound hard at first, but ctice makes perfect. Try information starters, and work your way up to "O" erator. It is best to pause a second be- een digits in a number.

If you wish to know when the phone is ringing, place a 100K ohm resistor in series with a NE 2 neon lamp across the telephone line (see diagram 3). The lamp will light when your phone rings.

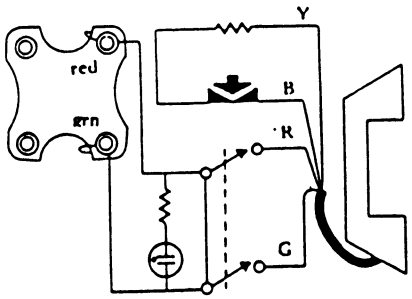
diagram 3



In order to make dialing a little easier, you might wish to substitute a push button switch (momentary contact, normally closed contacts) for the SPST switch. In that case, in order to "hang up" the phone, I would advise a double-pole double-throw (DPDT) switch connected to both sides of the line. To protect your phone from the possibilities of being "fried" by ring voltage it would be a good idea to connect a 1 mfd 150 volt electrolytic capacitor across the line (see diagram 4).

You can mount your finished "Poor Person's Phone" in a cigar box or similar container, or even place the whole thing in a glob of liquid plastic. To make the phone easier to use, you can add a "store bought" dial, and perhaps a simple speaker type jack and plug to make your new phone portable.

diagram 4



(Another Editor's Note: We would like to see photographs of your own "Poor Person's Phone" and hear about any modifications you may have added. The best ones we receive will be published in an upcoming issue of TEL.) □

A LITTLE LEXICON

(A Continuing Feature from TEL)

Blocking: The inability to interconnect two idle terminals in the switching network because one or more of the connecting links are in use for another call.

Enable pulse: Any current or voltage pulse that enables a circuit to become operative.

Interoffice trunk: Communications channel between two separate central offices.

Intraoffice trunk. Communications channel used to connect two subscribers lines in the same central office.

Loop: The two-wire circuit formed by the subscriber's telephone set, his cable pair and other conductors that connect it to the central office equipment.

Off hook: The condition that indicates a "closed" loop or the active state of a subscriber's line. This indicates that the phone is in use and has "closed" a loop with the central office.

On hook: The condition that indicates the idle state or "open" loop of a subscriber's line. Indicating that the phone is available to receive calls, an "open" loop exists between the subscriber's phone and the central office.

Talking path: The transmission path of a telephone circuit making up the tip and ring conductors, and the equipment connected to them.

Testboard: Equipment in central office used for access to subscriber lines to aid in line testing and diagnosing service breakdowns. □

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TAPE PHONE CALLS LEGALLY!*

with PHONE-CHEK

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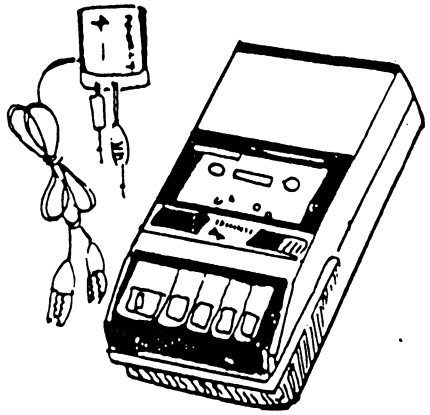
- RECORDS ALL CONVERSATIONS FROM ANY EXTENSION
- RECORDS ANSWERING SERVICE PICKUPS
- WARNING LABELS DETER UNAUTHORIZED OUTGOING CALLS



+ Up to 12 Hours Recording Time With The Deluxe Model
+ AC/DC Operation
+ Includes All Necessary Connectors!
+ Uses Standard Cassette Tapes

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AMERICAN EXPRESS AND OTHER CARDS ACCEPTED

** Federal law requires the consent of only one party to a phone recording. Check state and local regulations.*

NOW AVAILABLE for the Telephone Experimenter !

COMPLETE CONSTRUCTION PLANS

• • •

NOW! Teletronics introduces TWO NEW PLANS

TELEPHONE LINE RELAY

Flash lights, or sound gongs when your phone rings, Turns almost anything on or off in sync with your bell. $1.50

TELEPHONE HOLD BUTTON

Don't lose calls when you change phones, stop others from hearing your off line discussions. Works on single line phones. $3.00

BOTH NEW PLANS FOR ONLY: $4

BASIC CONSTRUCTION PLANS: $3.00 each

AUTOMATIC DIALER

:omatically dials numbers stored in its mag- ic memory. Works with Touch–Tone and :ary Dial, and stores hundreds of numbers.

"BLACK BOX"

/ice used by law enforcement agencies to nitor telephone converstaions. Hard to detect.

CALL LIMITER

ɔp uncontrolled long-distance calls made from ɹr phone. Device disconnects all long-distance s before they can be completed. A $ saver.

CENTRAL DIAL EXCHANGE

up your own telephone exchange in your me, or throughout your whole nieghborhood.

RECORDER-ACTUATOR

ıtomatically records all incoming and outgoing ls on your phone line. Very simple to build.

TELEPHONE SCHEMATICS

e basic schematics for most commonly used ephones, Bell, GTE, Stromberg-Carlson, etc.

TELELINK BURGLER ALARM

e the telephone line as a link to notify you ıen a break-in occurs. Good babysitter too!

ANSWERING DEVICE

Answers your phone, gives out an anouncment in your voice and takes a message, Automatically!

CALL DIVERTER

Answers your phone and dials a pre-recorded number to transfer the original call to another location. Easy to change the remote number.

CONFERENCE BRIDGE

Connects up to four lines for a true conference call. Answers the call and connects it to the conference automatically, auto disconnect too.

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Stop that harsh bell. Plays a pleasing melody each time your phone rings, Beethoven not bells.

REMOTE CONTROL

Call your house to turn on lights, start the stove, or water your lawn: all with your pocket encoder.

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Enjoy hands-free conversation, full duplex operation. Lets the whole family join in on the call.

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Easy to build camera. Takes pictures without a lens. Great for photo-experiments. Very organic!

ELECTRONIC PLANS:

MULTIFREQUENCY ENCODER NETWORK $5.00 each

New IC version now available, Very simple to build, stable tones and good output volume.

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SPECIAL PRICE! ALL OF OUR CONSTRUCTION PLANS only $25.00

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TELE-NEWS

MAGNETIC HANDSETS

Engineers at Bell Labs have designed a new type of telephone handset to accomidate users of hearing aids which have a telephone pick-up feature. The new handset produces a harmless electromagnetic field that is necessary for operation of the hearing aid. This magnetic field was once present in all handsets but was eliminated in more modern designs. The new handset is distinguished by a blue rubber grommet on the cord where it enters the handset. It is currently being tested at C&P in Baltimore and at New York Telephone.

TELEPHONES FOR THE DEAF

On May 2, 1975 what is believed to be the first transatlantic telephone call between two deaf persons, took place. The call was placed by Jack Ashley from the London Trade Center and received in Washington DC by the director of Deafness and Communicative Disorders, Department of Health Education and Welfare. They communicated with teletypwriters over normal telephone lines.

CENTRALIZED WHAT?

General Telephone of California has begun field testing of centralized answering and recording equipment, offering an alternative to customer owned or customer premises devices. The equipment was developed by General's Automatic Electric division. When the service is connected to a subcribers line the equipment automatically cuts in after a predetermined number of rings (adjustable from one to five). Features include answer and record, answer only, and variable announcement length. The customer uses his regular Touch-Tone buttons to control the unit for such functions as message record and playback. A special tone tells the customer that messages have been recorded. Remote access from any location is also provided through a special access number. □

sonic ranger 1000

MONITORS LEVELS IN:

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An Expandable System With Many Other Features

Unique Products Company
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DIAL-A-JOKE

"Maybe it's the telephone Daddy put in the basement that's causing the trouble."

big mother

(Continued from Page 10)

The monitoring devices worked this way: Once the unit locked onto a call, it would record on a temporary recorder the initial phase of each call. If it found nothing indicating electronic fraud, the temporary recording was erased and the equipment prepared to handle a new call.

But if the initial phase appeared to indicate, for example, that a blue box was being used, the equipment activated a master tape recorder that would record a segment or the entire content of the call. The master tape subsequently was sent to New York for analysis.

A Bell spokesperson stated that elaborate precautions were taken to assure that the tapes were studied by only a small group of trained security personell in New York. It was emphasized that at no time were the tapes listened to locally.

The spokesperson also pointed out that the Bell system will continue to crack down on electronic toll fraud, but that its present approach does not involve voice recordings. "We have found a better way to do it" he said in closing. □

NEW BELL BOOK

An updated revision of a book on the technical operation of the telephone industry's distance dialing network is available from American Telephone and Telegraph Company.

The revised copy of Notes on Distance Dialing, published in 1968, is to meet the requirements of the telecommunications industry for a single general information source on the basic operating principles of the network, AT&T said.

The book includes technical information required by manufacturing people. It also has material on the nationwide numbering and switching plans, plus equipment requirements and transmission considerations. New sections include material on Wide Area Telecommunications Services, Common Channel Interoffice Signaling and network management.

AT&T's Engineering and Network Services Department and Bell Labs prepared the revision with help from the USITA and the REA.

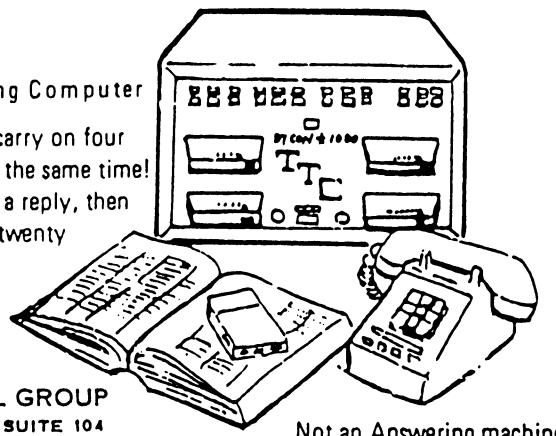
The 1975 edition can be purchased for $12.50 a copy pre-paid from Western Electric Company, Commercial Relations, P.O. Box 1579, Newark NJ, 07102.

PRESENTING

DYCON 1000

The Electronic Advertising Computer

The *DYCON 1000* can carry on four telephone conversations, at the same time! Waits up to ten seconds for a reply, then allows from 20 seconds to twenty minutes for each response.



for more information

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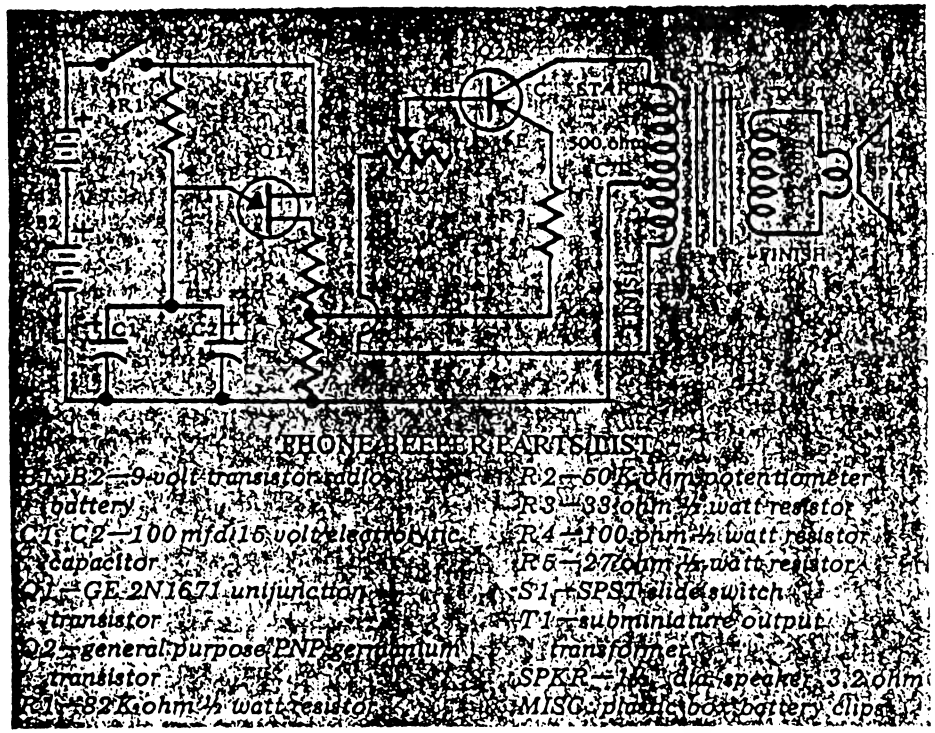
(213) 988-6121

Not an Answering machine:
A calling machine!

beeper

(Continued from Page 6)



NOTES: (1) When S1 is turned on, first beep takes about 30 seconds. Thereafter 15 seconds. (2) Test with 10K resistor across R1 to increase beep rate. (3) Q2 will not oscillate unless T1 leads are connected as shown. If no oscillation (no beep) reverse leads and/or adjust R2.

Construction may be varied to suit the builder, and the wiring placement is not critical. The author used a perforated board with components on top and point-to-point wiring and jumpers underneath. A cutout in the board accommodates the speaker.

A simple retainer, fashioned from 1/16 diameter piano or coathanger wire, is formed to fit around the telephone mouthpiece. A piece of foam rubber may be cut out to form a cradle for the handset.

TYPICAL "BEEPER" INSTALLATION

In use the first "beep" will take about 30 seconds after the unit is turned on. "Beeps" will follow regularly thereafter at aproximately 15 second intervals. Current drain should be about 2½ milliamperes, so the batteries should last over 200 hours with normal use.

If you regularly record telephone conversations of technical discussions, business transactions, long-distance calls or for any other purpose, the "phone beeper" will be a useful accessory to remind the party at the other end that they are being recorded, and may also prevent you from being charged with unlawful recording. The investment is small, the inconvenience slight and the results could be well worthwhile. □

c.o. opperations

(Continued from Page 7)

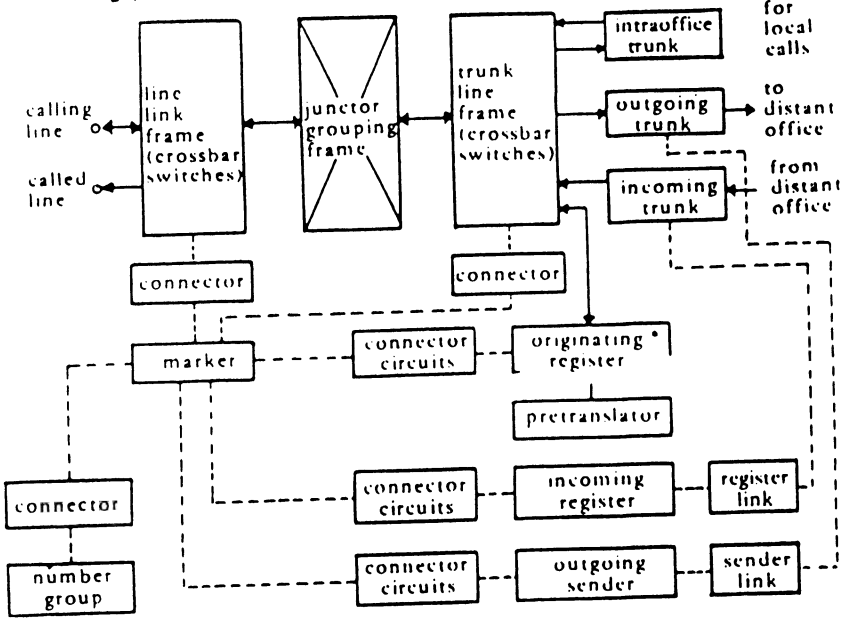
main frame to the line link frame equipment. Jumper wires are used to connect each incoming pair to the proper points on the horizontal side. It is in this manner that a "number" is assigned. The line link frame is composed of crossbar switches, named according to their function, they are *line* switches or *junctor* switches. All calls going into or out of the office pass through the line link frame.

Subscribers' pairs are connected to the line switches through the main frame. Equipment, called *junctors* connect to the junctor switches. Permanent wires, called *line links*, connect the junctor and line switches:, this is where the name line link comes from. Subscribers having similar service (i.e. flat rate, message rate, coin, etc.) are connected to the same line link frame.

The connecting paths employed within an office, or between offices, are called trunks and are connected to another switching frame called a *trunk link frame*. The trunk link frame is also composed of crossbar switches, called trunk switches and junctor switches. Trunks and equipment called *originating registers* terminate on the trunk switches. The junctor and trunk switches are permanently wired together.

The line link frame and trunk link frame are connected together by means of *junctors*. The combination of line link frame, junctor, and trunk link frame form a chain, with the closure of crosspoints, to interconnect the subscribers line with a trunk.

When dialing is completed, the originating register locates an idle *completing marker*. This marker is sqmetimes known as the brain of the crossbar system; its purpose is to assist in the actual connection to the called party. The completing marker receives the complete number from the originating register and determines from the first three digits in which office the called number is located. Next, the completing marker locates an available *outgoing sender* and gives it the last four digits of the called number. Then the completing marker locates an idle trunk on the trunk link frame, going to the desired office. The outgoing sender is now signaled to transmit the number to the distant office and the completing marker releases. The remainder of the call is handled by the distant office.



----= temporary connection for common control operations

*connected to calling subscriber line until dialing completed

BLOCK DRAWING OF No. 5 CROSSBAR SYSTEM

At the distant office the trunk terminates on a trunk link frame. At the time that the trunk was located by the completing marker, an *incoming register* was connected to the trunk at the distant office. This register receives the transmitted numbers and stores them, much like an outgoing register. The incoming register then finds a marker. This marker then connects to a *number group frame* to find the actual location of the called number's pair. After receiving the location, the marker tests the pair to see if it is "busy". If the pair is not "busy" the marker sets up a path from the trunk link frame through a junctor to the proper line link frame. A *ringing generator* is selected and the marker leaves the line. If the called pair tests out busy, the marker causes a busy signal to be sent to the calling party.

The main advantage of the No. 5 crossbar system lies in the fact that the common control equipment is used for only a few seconds per call. It is therfore available to set-up thousands of calls per hour. The first crossbar 5 office was built in 1947, however, it still represents the ultimate in sophistication for electromechanical switching systems. It was also, for all practical purposes, the last non-electronic system to be developed. Further articles in this series will deal with the development of the ESS or electronic switching system.

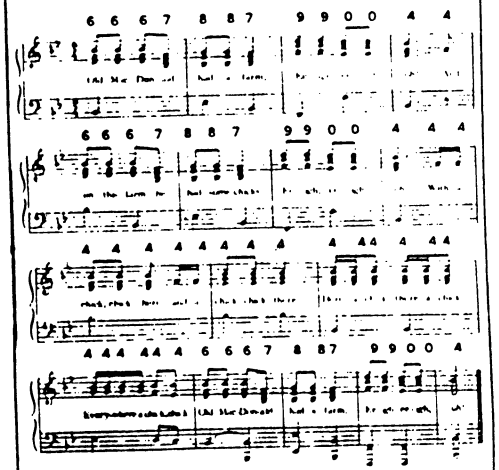
The first item of equipment used to establish a dialing connection is the *dial tone marker*. This is a rather complex device which directs the establishment of a a dialing circuit. When the subscribers handset is lifted, a *line relay* seizes an idle dial tone marker. The marker, in turn, locates the calling line on the line link frame and secures an originating register on the trunk link frame. The marker then closes a chain between the subscriber's pair and the trunk link frame. The dial tone marker also stores information about the class of service for the calling party and his location on the line link frame.

The originating register then returns the familiar dial tone sound to the caller, and receives and stores the digits dialed. □

touch-tone song of the month

OLD MAC DONALD HAD A FARM

Words and music traditional



trashing

(Continued from Page 3)

you rush out and dive into the trash heap. It is probably illegal, but no matter where you live, you certainly won't get the local policeman to hold your flashlight for you.

NOTICE

Mr. Osbert Kilgallen (Letters, April '75) has informed us that his current address is Box 527, Boston MA 02102. He regrets that some replies to his published letter, sent to his old address, may have been returned by the Postal Service.

BACK ISSUES

YES! TEL back issues are available. All issues from November '74 to April '75 are available for $1 each from: Circulation Department, TEL, 19730 Ventura Blvd., Suite 3, Woodland Hills CA 91364. Payment must accompany order.

classified advertising

Classified advertising costs $1 per line. A line contains 40 characters, including spaces and punctuation. A box service is also available for those who prefer not to receive replies at their home address. The charge for a box is $2.50 per ad per month and includes forwarding of all replies by first class mail. Your address will be kept confidential.

Classified advertising payment must accompany each order.

TEL also accepts display advertising, minimum size 1/8th page. Please apply for a copy of our rate card.

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GUARANTEED– 15% INCREASED MILAGE when used according to directions with all leaded non-leaded gas or diesel fuels & safe for autos, trucks-tractors, semis. SEND $3.50 Money Order to SEGAGCO; Box 9892, Jackson MS 39206 for treatment for 150 gals fuel & details. IT WORKS! No shipment made outside the 48 states–must ship UPS–ST Address/zip required.

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A.T. OF NEW YORK– YES

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LOS ANGELES, CALIFORNIA 90028

TELEPHONE CONFERENCE BRIDGE

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The Telephone Conference Bridge is a switching device capable of interconnecting as many as 4 telephone lines in such a manner that all parties on these lines may communicate with one another as a group. The circuit may be expanded to encompass as many lines as required or simplified to handle as few as two.

The Conference Bridge provides a number of switching features. For controlling each line, there are 4 switches and an indicator lamp. Because the circuit repeats 4 times, it is necessary to observe only one of these to gain an understanding of its operation. The switches which control line 1 circuitry are S1, S5, DMP1, and RST1.

S1 is essentially an on/off switch for line number 1. In the off position it disconnects all equipment from the line. When on, it allows the line to answer automatically into conference or into hold.

The position of S5 determines whether or not a line will answer into conference or hold. If a party calls in and this switch is in conference position, they will be connected with parties on the other lines. Should you wish to disconnect the party momentarily from the conference but not from the line, switch S5 should be placed in the hold position. Returning this switch to conference position will place the party back into conference.

If you wish to cut off the party on line 1 thus hanging up on them, press the DMP (dump) button. Under most circumstances the party will disconnect after a short time interval. If they do not disconnect after you have hung up, it is merely the equipment at the telephone company at fault, and not the Conference Bridge.

The RST (reset) button does just the opposite of the DMP button. It simulates a line ringing in. If you have a party on line 1, and you wish to place him into conference, press the RST button. They will then connect into conference or hold depending on the position of switch S5.

The lamp corresponding to each line serves as an indicator of the position of the relay for that line. Thus it indicates whether a party is on that line or not. It is advisable not to omit this, otherwise things may become confusing. Any other lamp voltage may be substituted for the six volt system.

Figure 1 is a partial schematic diagram of the Telephone Conference Bridge. Line 1 will be used as an example to explain the theory of operation. When a ring-in occurs, alternating current passes through C1 and operates RY1. The full-wave rectification serves to make the circuit more sensitive. RY1, thus operated, places its coil resistance across the line by shorting C1 through its contacts. This stops the ringing and answers the line just as lifting your telephone off-hook does. In addition, the operation of RY1 connects the line to points 1A and 1B, which lead to the conference network. When the party hangs up, a moment of zero voltage occurs on the line. However, in many systems it is necessary to press the DMP button to prepare the line for another incoming call.

It is advisable to use as sensitive a relay as possible, one requiring very little current. Telephone systems are current limiting and will power a limited number of devices at one time. In addition, your distance from the telephone central office is an important factor because distance decreases power.

Figure 2 is a schematic indicating two different ways you can wire the conference network. The first employs capacitors which are readily obtainable. The second involves a communications transformer consisting of 4 windings of equal impedance such as an Automatic Electric C-111. The transformer is usually better in terms of sound transmission though the difference is negligable.

Figure 3 is a wiring diagram indicating one way in which parts may be positioned. The parts should be mounted on 1/8 inch hardboard, bolted to the bottom of the chassis through spacers. We will not suggest any particular chassis size due to the variations the individual might employ in constructing his unit. The relays used may be of various shapes and sizes, you may wish to add or subtract lines, or you might arrange your switches differently. Therefore the chassis may be any size as long as it accomodates the parts comfortably. A good idea is to purchase your parts first and determine afterwards what chassis size would be adequate.

Most Bell System and independent telephone companies provide "plug and jack" telephones. We would recommend that you acquire a jack so that no screw terminal wiring is necessary to install your Conference Bridge. This also makes it easier to disconnect it from the line should you wish to take it somewhere else. If this is not possible, refer to figure 4 for wiring instructions on connecting the Conference Bridge to a screw terminal wall jack.

• PARTS LIST •

B1 - 6 V Battery
C1-C4 - 10-30 Mfd., 150 V Electrolytic
C5-C12 - 1 Mfd., 100 V
D1-D16 - 2 Amp., 200 PIV
L1-L4 - 6 V Lamps
RY1-RY4 - 4PDT Relay, 24 VDC, 500 Ohms
RST1-RST4 - SPST Momen. Con. Pushbutton Switch
DMP1-DMP4 - SPST Momen. Con. Pushbutton Switch
S1-S4 - SPST Toggle Switch
S5-S8 - DPST Toggle Switch

FIGURE 4

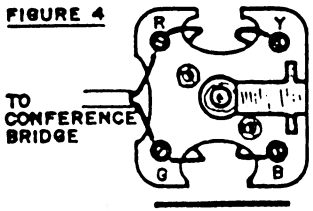


DIAGRAM SHOWING TELEPHONE WALL JACK

FIGURE 1

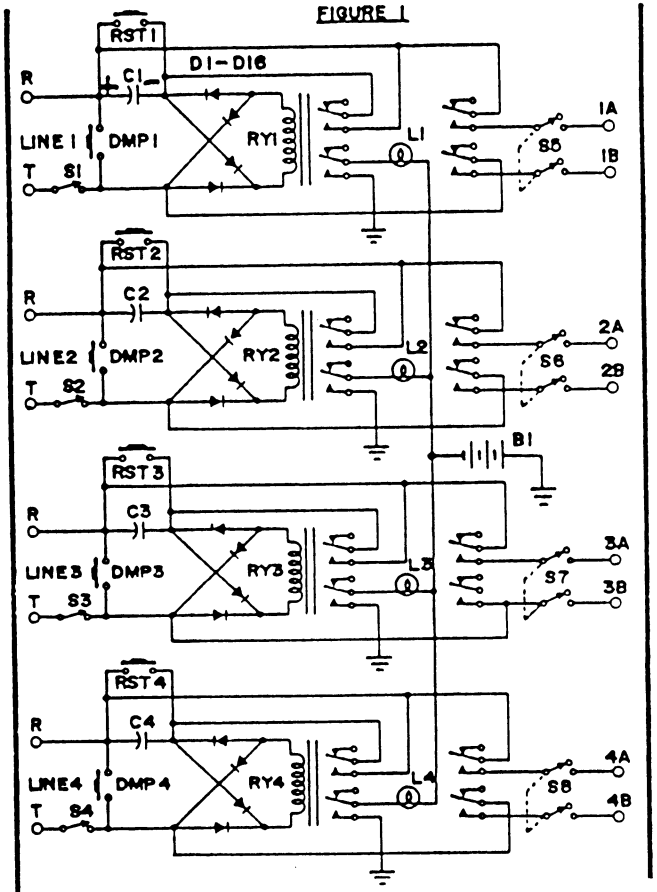


FIGURE 2

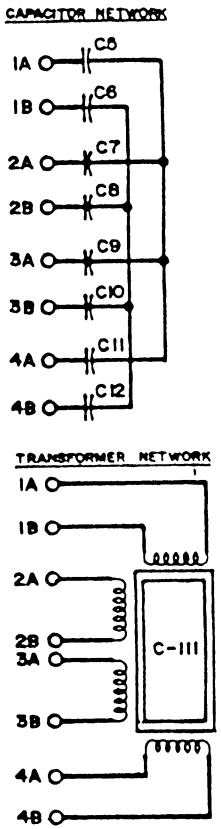
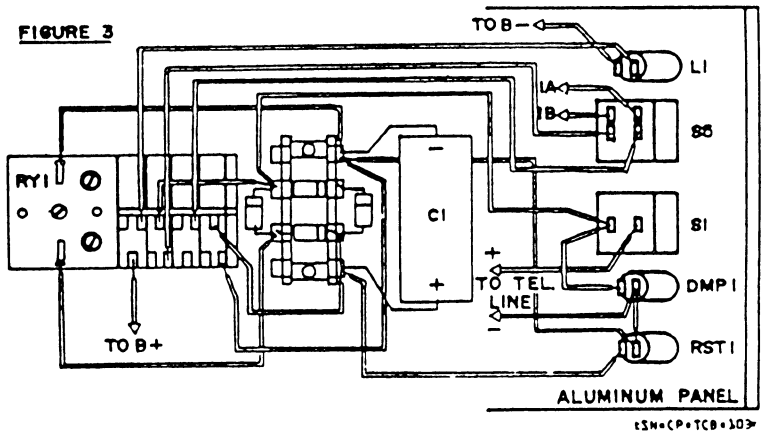


FIGURE 3



Laboratory Synthesis of DMT and DET

It has been determined through chemical analysis mediums that the hallucinogenic properties associated with the plant species Banistevia caapi are derived from the contained alkaloids harmaline and d-tetrahydroharamine, Furthermore another species "Prestonia Amazonicum" whose leaves impart a similar hallucinogenic tor por has been found to contain the psychotomimetic amine N, N-dimethyltrytamine, hence DMT. This latter species is that which concern will be placed upon, and as such, the synthetic derivation of such in a proposed laboratory medium. This species in extract has been utilized in conjunction with the latter for purposes of surpressing harsh unpleasant hallucinations. The extracted DMT has also been identified as a sub-component of the seeds of much "P-ptadonia".

Much work has been done on the laboratory derivation of such "substituted tryptamines" as the earlier DMT and similarly DET. Most commonly and readily found, and moreover most simply, is a thru stop process. Hence, in the further components thereof such a high yield process shall be outlined, as such its utilization in way of combustion in various mediums and inhalation of evaporated DMT and DET. The synthesis of DET is quite similar to that of DMT and thus will be merely refered to in way of differences from that of the synthesis procedure for DMT.

THREE STEP PROCESS FOR DMT SYNTHESIS:

Step 1

In a fully cooled (by means of ice water bath depressed by the addition of salt) flask (volume of 1000 ml) 400ml of pre-refrigerated (well cooled by prior storage in some sort of refrigeration medium) ether in the anhydrous state to which 60.0grams indole is disolved.

For the facillation of such a magnetic stirrer of an ultrasonic stirrer can be utilized, or for the lesser equipted laboratory a glass stirrer powered by either manual Kinesis or driven by some sort of driven-motor apparatus. In a separately funnel, similarly, 50grams of oxylchloride is added, to facilate its slow submersion into the previous solution (time for such should be 12 minutes). The combined contents are then submitted to stirring for a similar (12 minutes) period, and then the precipitate collected and washed with the remnants referred until convinced that as such fesible precipitate has been collected. Hence ends the first stage of the synthesis.

Notes: the indole solution should be cooled to 0°C (273K); oxalylchloride should be cooled at the same time to -5°C warning: the addition of the oxalylchloride should be made slowly so as to avoid boiling or splattering of such. Secondly, storage of all such components should be far removed from moisture, especially in the case of ~~oxaly-~~ oxalychloride since it readily absorbs moisture to react and form hydrochloric acid. Hence in all steps as IN ALL ORGANIC SYNTHESIS gloves should be used and protective clothing and eyeware worn.

Also put out by TEL

Step 2

In the 1000ml flask 400ml of cooled anhydrous ether is added to the precipitate of the previous and cooled further by the continued addition of crushed ice and salt or liquid nitrogen and acetone combined with "dry ice" (solid carbon di-oxide). Remove all but approximately 100grams of the indole oxalychloride. Two containers of 50grams are then well cooled below 0°C in a similar cooling medium, and then disolved in a 1:3 ratio of dimethylamine and anhydrous ether which has been previously well refrigerated.

Step 3

Prepare the indole glyoxal amide by forming, using Aluminum foil as a mold, into sticks if it is elected that ether shall be used as the solvent. A soxhlet extractor can be used to add the crystals to the ether; otherwise if Tetrahydroturan is elected the compound is readily added, since it disolves indole glyoxal amide, slowly in form of solution.

In the remaining portions due to the nature of tetrahydroturan the discussion will deal with the election of ether, if THF has been elected then merely utilize it in place of the other (THF is perfered, though possibly hard to obtain)

To a well mixed solution of Lithium Aluminum Hydride in quantity of 15grams in 300ml of anhydrous ether the above molded sticks one added in total of 20grams. Continue stirring for 90 minutes; then follow by cooling in an ice bath and slowly hydrolyze the complex with small particles of ice, until the end-reaction point has been slightly passed. Wash this several times with ether-methanol and evaporize and condense utilizing an apparatus as shown in figure #2.

diagram here

Note: Lithium Aluminum Hydride is a very strong reducing agent and reacts violently upon contact with moisture (inflamiable, especially in an ether solvent)

The collected products contain a syrupy mass, crystals of DMT are then added to accelerate the drying, otherwise it will take several days to fully crystalize.

This product is quite crude DMT but can be used in this form for both inhalation of evaporated vapors or combustion in some sort of medium.

Allow the amine solution to approach room temperature. The solution is the added slowly to the indole oxalylchloride solution with concurrent stirring to facillitate the proper reaction thereof, continuing such for some 30 minutes thereafter allowing the temperature to converge to ambient. Using the apparatus pictured in figure #1 the precipitate is vacuum filtered and washed several times with ether, and followed by an ether-water wash. The precipitate is then recrystalized using either hot ethanol or a menthanol-benzene mixture.

Recrystalization:

In a graduate cylinder a 50-50 mixture of benzene and methanol (100ml of benzene with 100ml of menthanol) is well mixed and then added as a covering of the precipitate. The beaker is then

NOTICE

Dear Telephone User:

On March 25, 1976, the Superior Court of California, County of Los Angeles, entered an injunction in favor of The Pacific Telephone and Telegraph Company and against Teletronics Company of America, and others. Your name appeared on a list (provided under Court order) of subscribers, or potential subscribers, to material previously published and distributed by Teletronics Company of America. Accordingly, for your protection and benefit, you are hereby given the following notice:

IT IS A VIOLATION OF STATE AND FEDERAL LAW TO USE ANY INSTRUMENT, DEVICE OR SCHEME TO OBTAIN ANY TELEPHONE SERVICE WITHOUT PAYMENT OF THE LAWFUL CHARGES THEREFOR. IT IS ALSO A CRIME TO PROVIDE INFORMATION TO ANY PERSON WHICH IS USEFUL FOR SUCH PURPOSE. IN MANY STATES, THE POSSESSION OF OR DISSEMINATION OF PLANS OR INSTRUCTIONS FOR SUCH DEVICES IS A CRIMINAL OFFENSE.

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THIS STATEMENT IS BEING SENT TO YOU BY ORDER OF THE SUPERIOR COURT OF CALIFORNIA, COUNTY OF LOS ANGELES.

The Pacific Telephone and Telegraph Company